

A close-up photograph of a green leaf, showing the intricate network of veins. The central vein runs vertically down the middle, with smaller veins branching out to the left and right. The leaf's surface has a fine, granular texture. The lighting is soft, highlighting the vibrant green color and the structural details of the leaf.

Sustainable collaboration between
municipalities and local energy cooperatives

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A design study to the collaboration between Dutch municipalities and local energy cooperatives to contribute to the energy transition

COLOPHON

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“Don’t stop thinking about tomorrow”
Fleetwood Mac

Preface

During my time as a student, the topic of sustainability became more relevant. However, the implementation of sustainable concepts seems to be hard. Sustainability and the public/private relationship always had my attention. The complexity of this relationship asks for new forms of collaboration. For my master thesis, I researched the collaboration between municipalities and local energy cooperatives. Therefore, I am happy that both these subjects are combined in my thesis.

Although you have to execute your graduation thesis on your own, I was not alone during this journey. First of all, I would like to thank my committee for providing constructive feedback and brainstorming to improve the project. Their feedback brought this master thesis to a higher level. First of all, I want to thank my first supervisor, Daan Schraven, for his support and feedback, especially at times whenever I got stuck in my head. Secondly, my second supervisor, Marian Bosch-Rekvelde, for her useful guidance throughout the whole project. Lastly, my professor, Thomas Hoppe, for his critical but helpful comments.

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Last but not least, I would like to thank my family, my boyfriend, and my friends. For always being there, listening, reading, brainstorming and telling me that 'in the end, it'll be fine'.

Enjoy reading!

Marloes Emmen
Rotterdam, December 2020

Executive Summary

Sustainability is becoming more important in our society. One of the actions for a sustainable future is starting an energy transition for the reduction of greenhouse gases. For realising this transition, local energy cooperatives are initiated. Within these local energy cooperatives, a collective of citizens is willing to generate and distribute renewable energy. For the development of these projects, a collaboration with the municipality is needed. However, there are barriers within this collaboration that withholds the collaboration to become sustainable. These barriers are defined as: (1) the attitude of the municipality, (2) the group dynamics and group composition of the local energy cooperative, and (3) the ignorance of the two parties. The objective of this research is understanding and designing a process for both municipalities and local energy cooperatives which facilitates their collaboration. Therefore, the main research question is:

How can municipalities and local energy cooperatives improve their collaboration to facilitate the energy transition?

For answering this question, a literature study is executed regarding the concept of local energy cooperatives, collaboration, governance arrangements, intermediaries, and theoretical perspectives on transition. Insights from these subjects together form the theoretical framework for the rest of the research.

A concept of design thinking, the Double Diamond method, is used for the development of the design. This method consists of four stages: Discover, Define, Develop, and Deliver. The method is divided into two diamonds, these diamonds are based on the concepts of divergent and convergent thinking. The first diamond is focussed on defining the problem by executing a literature study, three case studies, and verification interviews. The second diamond is focussed on developing a design by studying other areas and sectors. Together with the insights from the first diamond, this study forms the input for a design. This design is validated in an online survey by the participants of the interviews.

In the Discover-phase the problem is deepened by studying three cases in North-Brabant. The collaboration between municipalities and local energy cooperatives in the cities of Breda, Eindhoven and 's-Hertogenbosch is studied. The barriers for collaboration, as identified in the problem statement, appear to be present in the three cases. These insights from the case studies are verified by overarching national parties in the Define-phase. The perspective of the municipalities is represented by EnergieSamen and for the perspective of the local energy cooperatives, Platform31 is interviewed. The outcomes of this Define-phase are the defined problem and requirements for the design.

The Define-phase results in deepened barriers for collaboration. The attitude of the municipality is caused by several aspects. The municipality has several roles within society, which are represented by several departments. Each of these departments has its objectives and visions, which might conflict with each other. Besides, the municipality has to be an independent and transparent partner in the collaboration. Favouring a local energy cooperative without questioning other parties may imply favouritism. Due to the redistribution of governmental tasks, more tasks are assigned to the municipalities. However, the financial and human resources did not increase to the same extent. Therefore, the municipality is not able to assign sufficient resources to all their tasks. The group dynamics and group composition of the local energy cooperative depend on attracting citizens with expertise in the juridical or financial domain. Experts in these domains are needed to establish a professional organisation. The establishment of a professional organisation stimulates collaboration with the municipality. The barrier of ignorance is present in both parties. The municipality experiences a lack of knowledge in the collaboration with local energy cooperatives and the energy transition. The

same applies to the local energy cooperatives. Currently, there is no overarching procedure to clarify the process of collaboration between the two parties to stimulate the energy transition.

The literature study and interviews learn as well that an enabling mode of governing and a facilitating intermediary role by the municipality have a positive influence on the collaboration between municipalities and local energy cooperatives. For the implementation of the energy transition, the focus should be on knowledge sharing, collaboration, evaluation in small niches. The projects of the local energy cooperatives can function as niches for the energy transition.

For the design, other areas and sectors regarding the collaboration between municipalities and citizens are studied in the Develop-phase. Studying the other areas results in defined purposes of the process design: (1) the internal organisation of both parties, (2) knowledge sharing about the energy transition and local energy cooperatives, and (3) clarifying the collaboration and communication during the process of project development. Besides, all other areas and sectors divided the process of their project into five stages of project development. All activities of the preceding stages have to fulfilled before entering the following stage.

In the Deliver-phase, the requirements and purposes result in a process design of the five stages of project development in which the activities per phase and actor are defined. Besides the activities per actors, there are activities for alignment defined as well. The process design is assigned to both parties, to clarify the collaboration and the process of actors involved. The concept design is validated by an online survey, resulting in a validated process design as shown in Figure 0.1. The validation is executed by the participants of the interviews. Therefore, both the perspectives of the municipalities and the local energy cooperatives are taken into account.

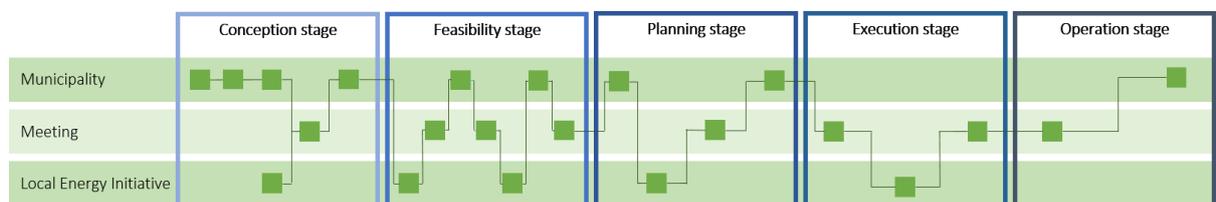


Figure 0.1 Overview of the final process design

During this research, the collaboration between municipalities and local energy cooperatives is considered important for realising an energy transition. All interviewees acknowledge the willingness of the parties, but address the struggles to realise a sustainable collaboration. For this collaboration, an overarching process is lacking. The outcome of this research can be used by municipalities to prepare for this collaboration, and the municipalities could provide this process to local energy cooperatives to align the expectations for the collaboration. By aligning the roles, expectations, and interests during the collaboration, municipalities and local energy cooperatives can facilitate the energy transition.

Table of Content

<i>Preface</i>	<i>iii</i>
<i>Executive Summary</i>	<i>iv</i>
<i>List of Figures</i>	<i>viii</i>
<i>List of Tables</i>	<i>ix</i>
<i>List of Definitions</i>	<i>x</i>
1 Introduction	1
1.1 Introduction	2
1.2 Problem statement	3
1.3 Research goal and objective	4
1.4 Research questions	5
1.5 Thesis outline	5
2 Literature Study	7
2.1 Energy initiatives	8
2.2 Collaboration	11
2.3 Governance arrangements	13
2.4 Intermediaries	17
2.5 Perspectives on transition	18
2.6 Theoretical framework	25
3 Double Diamond	26
3.1 Design research	27
3.2 Discover-phase	28
3.3 Define-phase	31
3.4 Develop-phase	31
3.5 Deliver-phase	32
4 Results and Analysis	33
4.1 Discover-phase	34
4.2 Define-phase	49
5 Design	54
5.1 Develop-phase	55
5.2 Deliver-phase	58

6	<i>Discussion</i>	66
6.1	<i>Scientific relevance</i>	67
6.2	<i>Applicability of the research</i>	69
7	<i>Conclusions</i>	71
7.1	<i>Research question</i>	72
7.2	<i>Limitations of the research</i>	75
7.3	<i>Recommendations for further research</i>	75
7.4	<i>Implications for practice</i>	76
8	<i>Reflection</i>	77
9	<i>List of Literature</i>	79

List of Figures

Figure 0.1 Overview of the final process design	v
Figure 1.1 Barriers in collaboration between municipalities and local energy cooperatives	4
Figure 1.2 Thesis outline	6
Figure 2.1 10 types of local energy initiative concepts in the literature	8
Figure 2.2 Project stages of community-focused initiatives combined with the process model for collaboration	12
Figure 2.3 Components of governance arrangements	14
Figure 2.4 Modes of governing in local energy transition policy	16
Figure 2.5 Types of roles and activities for intermediary organisations	18
Figure 2.6 Multilevel perspective on transitions	21
Figure 2.7 Transition Management cycle	23
Figure 2.8 Theoretical framework	25
Figure 3.1 Application of the Double Diamond method	28
Figure 3.2 Case locations	29
Figure 4.1 Double Diamond method in chapter 4	34
Figure 4.2 Organisational chart of the municipality of Breda	36
Figure 4.3 Mode of governing of the municipality of Breda	37
Figure 4.4 Intermediary role of the municipality of Breda	38
Figure 4.5 Organisational chart of the municipality of Eindhoven	39
Figure 4.6 Modes of governing of the municipality of Eindhoven	41
Figure 4.7 Intermediary role of the municipality of Eindhoven	42
Figure 4.8 Organisational chart of the municipality of 's-Hertogenbosch	43
Figure 4.9 Modes of governing of the municipality of 's-Hertogenbosch	45
Figure 4.10 Intermediary role of the municipality of 's-Hertogenbosch	46
Figure 4.11 Defined problem	53
Figure 5.1 Double Diamond method in chapter 5	55
Figure 5.2 Stages of project development in community energy projects	56
Figure 5.3 Project development stages for the process design	56
Figure 5.4 Project development stages for advice cooperatives	56
Figure 5.5 Overview of the process design	59
Figure 5.6 Validated Conception stage	60
Figure 5.7 Validated Feasibility stage	61
Figure 5.8 Validated Planning stage	62
Figure 5.9 Validated Execution stage	63
Figure 5.10 Validated Operation stage	64
Figure 5.11 Validated process design	65
Figure 7.1 Overview of the final process design	74

List of Tables

Table 2.1 Reasons and difficulties for new governance arrangements	15
Table 2.2 Selection criteria for a mode of governing	16
Table 2.3 Mode of governing selection	17
Table 2.4 Selection criteria for perspectives on transition	19
Table 2.5 Transition perspective selection	24
Table 3.1 Input for the empirical research based on the theoretical framework	28
Table 3.2 Case specifics	29
Table 3.3 Overview of interviewees	30
Table 3.4 Theoretical input for the semi-structured interviews	30
Table 3.5 Transcript analysis	31
Table 3.6 Areas of research	32
Table 4.1 Cases and their specifics	35
Table 4.2 General insights regarding collaboration	47
Table 4.3 General insights regarding knowledge	48
Table 4.4 Governing through enabling in the three cases	49
Table 4.5 Facilitating intermediary role in the three cases	49
Table 5.1 Reasons for research	56
Table 5.2 Aspects that need to be taken into account per stage	58

List of Definitions

Brabant-5 (B5)	The collective name for the five largest cities in North-Brabant: Breda, Eindhoven, Helmond, 's-Hertogenbosch, and Tilburg (Provincie Noord-Brabant, 2010).
Bottom-up initiatives	In terms of cities, these initiatives for change and improvement are started by the citizens who live in the city and 'use' the city (Breuer, Walravens, & Ballon, 2014).
Double Diamond Method	Design thinking method which is divided into four stages; Discover, Define, Develop, and Deliver (Tschimmel, 2012).
Energie loket	Energy counter - Physical or online location for where citizens can receive information about the energy transition and ask questions (Hovens, 2016).
Energy transition	Transforming the current fossil fuel resources of energy into renewable resources and reducing the amount of energy being used (Kunze & Becker, 2015).
Local energy cooperative	Local energy cooperatives are energy transition initiatives, started by citizens, that are aimed at generating and distributing decentralized renewable energy related to a specific context, combined with the stimulation of energy savings (Kayhan 2014; Warbroek and Hoppe 2017).
Regionale Energie Strategie (RES)	Regional Energy Strategy - Every region in the Netherlands has to develop a strategy to answer the national sustainability task (Bos, Brummans, van Oort, & Koenraad, 2018).
Regeling Reductie Energiegebruik (RRE)	Scheme for Reduction of Energy Use - Payment for municipalities by the national government to stimulate private homeowners to take energy-saving measures in their homes (Programma Aardgasvrije Wijken, 2019).
Top-down approach	The approach led by actors on an upper hierarchical level and based on central authority and control (Capdevila & Zarlenga, 2015).

Introduction

Problem statement

Research goal and objective

Research questions

Thesis outline



1.1 INTRODUCTION

Currently, there is an increasing amount of attention drawn to the topic of sustainability. In 2015, 195 countries confirmed to the Paris Climate Agreement to decrease climate change and prevent global warming. One of the most important statements of this agreement is a 49% reduction of greenhouse gases, relative to 1990, by the year 2030 (Koelemeijer, Koutstaal, Daniëls, & Boot, 2017). This international treaty encourages the national authorities to develop policy on how their country can answer to these agreements. The Netherlands is one of the countries that is part of this international agreement, and this led to a Dutch Climate Agreement ('het Klimaat Akkoord') and Climate Law ('Klimaatwet'). Within the elaboration of the policy, the parliament states that the municipalities play a major role in achieving these goals (Ministry of Economic Affairs and Climate Policy, 2020). Following the Dutch Climate Agreement ('het Klimaat Akkoord') and Climate Law ('Klimaatwet'), the policy of municipalities radiates a high sustainable ambition in reducing greenhouse gases. For example, the municipalities of Breda, Eindhoven, and 's-Hertogenbosch have formulated a document that expresses their ambition to stimulate the energy transition by reducing their CO₂ emissions and increase their renewable energy production (Aartsen, van het Hof, & van Drunen, 2018; Gemeente Eindhoven, 2016; van der Geld, 2019).

This reduction of greenhouse gases is possible by starting an energy transition. The energy transition is two-fold; an aspiration to transform the current fossil fuel resources of energy into renewable resources and to reduce the amount of energy being used (Kunze & Becker, 2015). In the last couple of years, multiple innovative technologies are developed which makes it possible to generate renewable energy locally and to distribute this energy. These innovations are aimed at decentralising the current centralized energy system for the generation and distribution of renewable energy (Imbault, Swiatek, De Beaufort, & Plana, 2017). All technologies are in place to be realized, however, the implementation of the transition is lacking (Nochta & Skelcher, 2020).

For the implementation of the technologies and the realization of an energy transition, the municipalities may receive support from their citizens, in the form of the establishment of local energy cooperatives (Kayhan, 2014). Over the past 20 years, local energy cooperatives have been started within municipalities and they were an important element for the transition to renewable energy within these cities (de Bakker, Lagendijk, & Wiering, 2020). Before 2019, 482 local energy cooperatives were started. Over the last year, 100 new local energy cooperatives were registered in the Netherlands, which makes a total of 582 collective initiatives in the Netherlands at the beginning of 2020. These initiatives differ in their size, financial capabilities and goals, but they all aim at enabling the generation of renewable energy and its distribution (Dóci, Vasileiadou, & Petersen, 2015; Schwencke, 2020). The transition is considered to establish a shift from natural gas to renewable energy (de Bakker et al., 2020). Most of the local energy cooperatives (80%) focus on the generation of solar power, followed by the initiatives that develop projects focusing on wind power. In some local energy cooperatives, both solar and wind power are being generated. The number of cooperatives that are establishing projects regarding energy savings, thermal heat, and other renewable energy resources is small but growing. Dutch knowledge platform, 'HIER Opgewekt' estimates that 85.000 citizens are participating in local energy cooperatives in the Netherlands (Schwencke, 2020).

Local energy cooperatives are energy transition initiatives that are aimed at generating and distributing decentralized renewable energy related to a specific context, combined with the stimulation of energy savings (Kayhan 2014; Warbroek and Hoppe 2017). These energy transition initiatives are started by enthusiastic citizens, who are willing to generate their demand for energy by themselves and share it with their community. These initiatives are registered as cooperatives and attempt to reduce the gap between sustainable policy and execution by starting to develop and execute their innovative ideas. The cooperatives benefit from help from the municipalities in the form of support during permit application, financial support, and expertise (Warbroek, 2019; Warbroek & Hoppe, 2017). It seems that, without the participation of citizens in governmental initiatives or governmental support in local energy

cooperatives, the energy transition is much harder to achieve (Hirschl, 2018). Corsini, Certomà, Dyer & Frey (2019) emphasize as well that this interest of municipalities in local energy cooperatives is needed for the stimulation of the energy transition in general. Despite all current innovations and willingness of municipalities and citizens, the studies of Corsini et al. (2019) and Hirschl (2018) imply as well that there still seem to be room for development for realizing the projects of local energy cooperatives in terms of collaboration.

1.2 PROBLEM STATEMENT

Kayhan (2014) states that not all started energy initiatives are being realized, due to several reasons. In reality, there are multiple actors involved throughout the whole process, and one of the occurring phenomena is the difficulty to create sustainable collaboration (Warbroek, 2019). This research focusses on the difficulties within the collaboration between Dutch municipalities and local energy cooperatives. In practice, all local energy cooperatives studied by 'HIER Opgewekt' (2020), are collaborating with the municipality on some level. Studies in the literature (Hentschel, Ketter, and Collins 2018; Hoppe et al. 2015; Oteman, Wiering, and Helderma 2014; Seyfang et al. 2014; Warbroek and Hoppe 2017), show that there are municipalities and local energy cooperatives that can establish a sustainable relationship and that there are municipalities that struggle with this type of relationship. The level of collaboration between the two parties varies from meetings and providing services to the execution of the project (Schwencke, 2020). However, there are non-supportive interactions between municipalities and local energy cooperatives (Warbroek & Hoppe, 2017). This leads to problems establishing a sustainable collaboration (Kayhan, 2014). In some cases, this non-supportive collaboration leads to the cancellation or delay of the execution of the initiated project. Concluding, the relationship between the municipality and the local energy cooperative seems to be an important boundary condition for the execution of the project (Schwencke, 2020). However, there are multiple barriers in the collaboration between municipalities and local energy cooperatives.

The first barrier in the collaboration between the municipality and the local energy cooperatives is the attitude of the municipality, it does not seem to coincide with the increasing number of local energy cooperatives (Oteman, Kooij, & Wiering, 2017). Despite their willingness, municipalities are not able to facilitate these local energy cooperatives and it seems that municipalities are not designed to deal with these cooperatives and the energy transition. Reasons for that are the structural or cultural changes in terms of network governance that have to be made beforehand. In essence, multiple actors inside the municipality have to collaborate with energy transition initiatives to attain the sustainable ambitions of the municipality (Nochta & Skelcher, 2020). Besides that, the municipality tends to approach the energy cooperatives as consumers instead of actors in the energy transition (Oteman et al., 2017). Kayhan (2014) states that governments should pay more attention to energy transition initiatives at the municipal level and stimulate their innovations. Room for these cooperatives should be incorporated in their policies, in which the non-monetary value of these initiatives to the energy transition should be recognized (Schmid, Meister, Klagge, & Seidl, 2020). An additional challenge of the municipalities is having to share their decision-making process with energy initiatives (Corsini et al., 2019; Wolf, Nogueira, & Borges, 2020). Due to this challenge, there is an unequal balance of power between the initiatives and the municipalities and a non-transparent process (Oteman et al., 2017; Wolf et al., 2020).

The second barrier in the collaboration is the group dynamics and group composition of the local energy cooperative during the process. Citizens within the local energy cooperative might lose their motivation and the initiative itself might lose the support of the community, due to the professionalization of the cooperative and the rise of complexity by including the municipality (Hoppe et al., 2015). Another possible effect is caused by the homogeneous group of interested citizens. It might be possible that not all relevant areas of skills are covered by the participating citizens, which causes problems on the long-term (Hirschl, 2018; Koehrsen, 2017). This may lead to an energy initiative that is not coherently and

strategically managed, which results in a cooperative that is lacking direction and content (Seyfang et al., 2014). By extension, the local energy cooperatives might not have the right contacts and skills to properly develop their ideas (Kayhan, 2014).

The third barrier is the ignorance within municipalities and local energy cooperatives. Sustainability officials of municipalities believe that the attitude of the municipality towards energy cooperatives might be caused by a scarcity of knowledge and a lack of sharing knowledge with other parties (De Vries, Vringer, Wentink, & Visser, 2019). In addition, Markantoni (2016) states that problems within these collaborations are caused by a lack of clear regulations, communication, and coordination. This may be caused by the lack of knowledge of proper governance arrangements (Ruhlandt, 2018). Besides that, municipalities might not be aware of the local initiatives that are taking place and local initiatives might not be fully informed about the legislation and requirements of the municipality (Kayhan, 2014). It seems to be important to integrate the diverse lessons that are learned through the years and distribute these lessons to both parties (Hoppe & Van den Akker, 2014; Wolf et al., 2020).

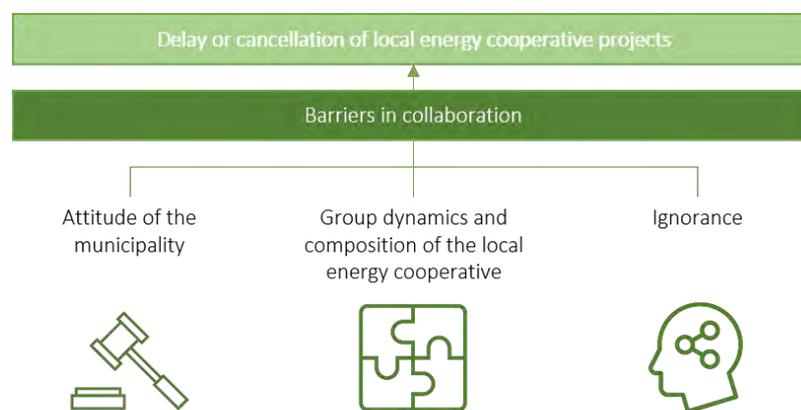


Figure 1.1 Barriers in collaboration between municipalities and local energy cooperatives (own illustration)

The barriers influencing the collaboration between the two parties are shown in Figure 1.1. These stated issues apply across municipalities and the studies show that these barriers have a negative influence on establishing and realising local energy cooperatives. Although municipalities are not all organised in the same way, the wheel does not have to be reinvented for each of them. This research will focus on how municipalities and local energy cooperatives can collaborate to realise their goals. This collaboration may be described as a sustainable collaboration which stimulates the intended energy transition. Therefore, the problem statement of this research is that, due to several barriers, both the municipalities and the local energy cooperatives seem not to be able to establish a sustainable collaboration to stimulate the energy transition.

1.3 RESEARCH GOAL AND OBJECTIVE

The goal of this research is to contribute to the energy transition by stimulating local energy cooperatives and facilitating a sustainable collaboration between municipalities and local energy cooperatives. The objective of this research is understanding and designing a solution for both municipalities and local energy cooperatives which facilitates their collaboration.

The research is executed in cooperation with Brink Management/Advies. Brink Management/Advies provides management and advisory services related to real estate and area development issues. During their projects related to municipalities, sustainability becomes increasingly important. For this research, citizen participation in the energy transition is researched and an advice is written for the municipalities.

1.4 RESEARCH QUESTIONS

To achieve the research objective, the main research question and four sub-questions are formulated. The relation between the chapters and the formulated research questions can be found in Figure 1.2.

How can municipalities and local energy cooperatives improve their collaboration to facilitate the energy transition?

1. *What are the characteristics of a collaboration between municipalities and local energy cooperatives?*

For understanding the problems in the collaboration between municipalities and local energy cooperatives, the two actors and the aspects for collaboration need to be studied. These aspects of collaboration are used for studying the cases. Besides, four perspectives on transition are studied for the identification of aspects that need to be taken into account for the implementation of a design for collaboration in the energy transition.

2. *How to capture and apply the aspects of collaboration between municipalities and local energy cooperatives?*

The Double Diamond method is selected for the empirical research and the design process. This method consists of divergent and convergent thinking to analyse the problem in the literature and practice. Besides, the method is used to define the requirements for the process design.

3. *What insights in the collaboration between municipalities and local energy cooperatives need to be applied in a design?*

To answer this question, the Discover- and Define-phase of the Double Diamond are applied. The empirical research consists of three case studies and two verifying interviews by overarching national parties. Outcomes of these interviews, combined with the insights from the literature, form the basis for the design process.

4. *How can the insights be incorporated in a design and validated to facilitate the collaboration between municipalities and local energy cooperatives?*

The insights from the Discover- and Define-phase are used to state a defined problem and requirements for the process design. This forms the basis for the Develop- and Deliver-phase. In these phases, process design is constructed using these insights. The constructed process design is validated by an online survey.

1.5 THESIS OUTLINE

Each sub-question represents a chapter in this thesis, together they form the outline of this thesis. An overview of this layout is presented in Figure 1.2. In the second chapter, the literature will be studied to identify the problem regarding the energy transition. Followed by the third chapter, which will present the research design on how to answer the general research question. Results of the research will offer insights into the collaboration between local energy cooperatives and municipalities, these results will be given in chapter four. The fifth chapter is about the design for improving the collaboration between local energy cooperatives and municipalities. In the final chapter, an answer will be given to the general research question.

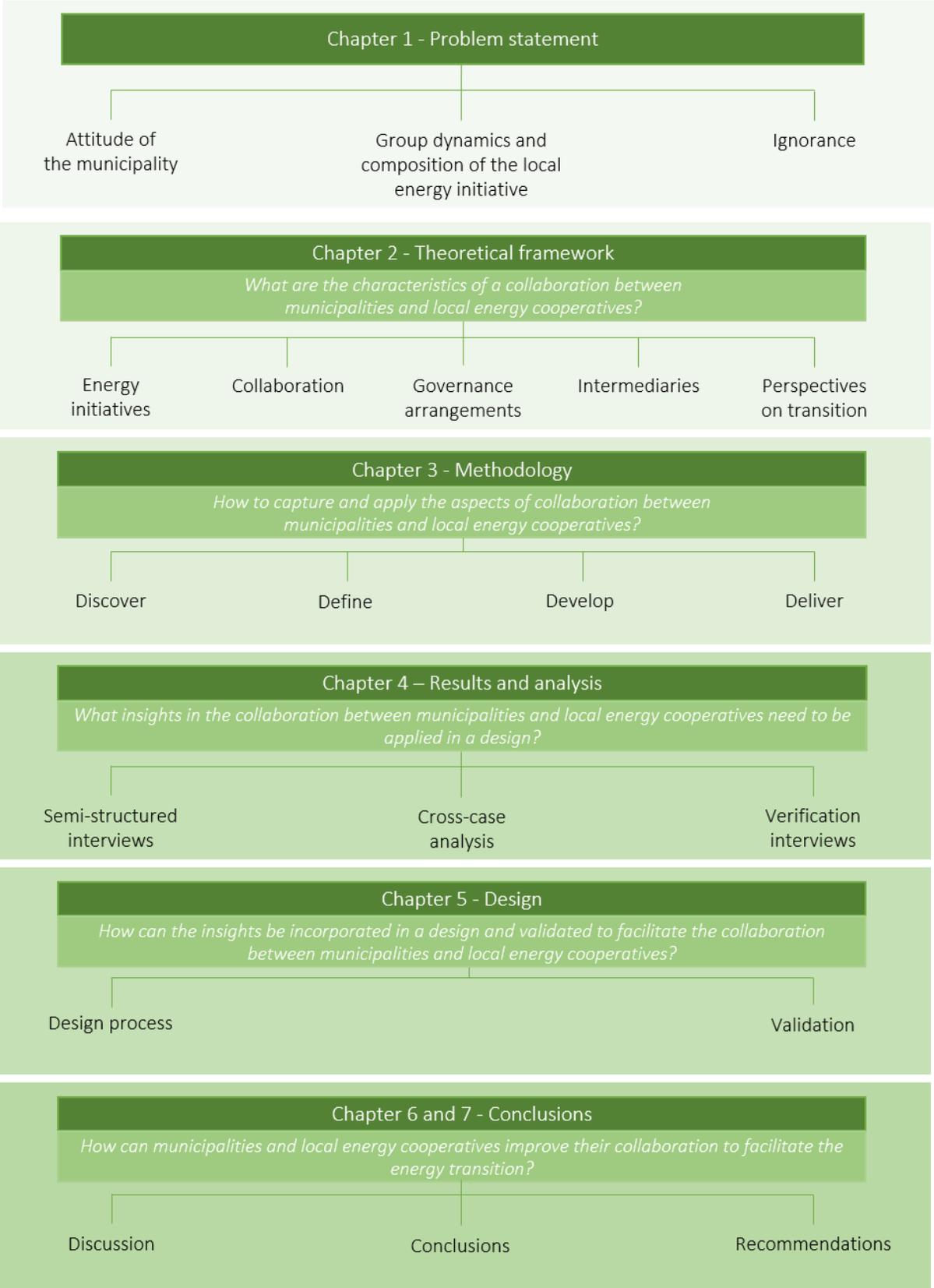


Figure 1.2 Thesis outline



Literature study

Energy initiatives

Collaboration

Governance arrangements

Intermediaries

Perspectives on transition

In this chapter, the literature was being studied to answer the first sub-question: *What are the characteristics for collaboration between governments and local energy cooperatives?* The various initiatives within the energy transition are reviewed, and the role of the local energy cooperatives in the energy transition is analysed. After studying the concept of local energy cooperatives, collaboration within the project development of renewable energy projects is studied. After analysing local energy cooperatives and the stages of project development, the collaboration between municipalities and citizens is studied in the form of governance arrangements. Followed by the section of intermediaries, in which the role of the municipalities within these arrangements is studied. At the end of this chapter, four theoretical perspectives on transition are analysed for the implementation of a new form of collaboration in practice.

2.1 ENERGY INITIATIVES

Collaboration is an important aspect of local energy cooperatives (Warbroek, 2019). Before researching the collaboration between governments and local energy cooperatives, it is necessary to be specific to the concepts of energy initiatives being used in the literature. In the literature, ten concepts of energy initiatives regarding the energy transition can be identified; collective energy, community energy, distributive energy, local energy, decentralized energy, participatory energy, citizen energy, collaborative energy, civic energy, and cooperative energy (Corsini et al., 2019; Imbault et al., 2017; Mengelkamp, Gärttner, & Weinhardt, 2018; Moroni, Alberti, Antoniucci, & Bisello, 2018; Poursanidis et al., 2019; Rajasekhar, Pindoriya, Tushar, & Yuen, 2019; Skjølsvold, Throndsen, Ryghaug, Fjellså, & Koksvik, 2018; Van Cutsem, Ho Dac, Boudou, & Kayal, 2020; Verkade & Höffken, 2019; Yi, Feiock, & Berry, 2017). Each type has its focus and purpose, however, a careful review helps unveil four overarching categories in order to be more specific on their differences and similarities. Figure 2.1, proposes a division of the initiative types accompanying their focus within these overarching groups.

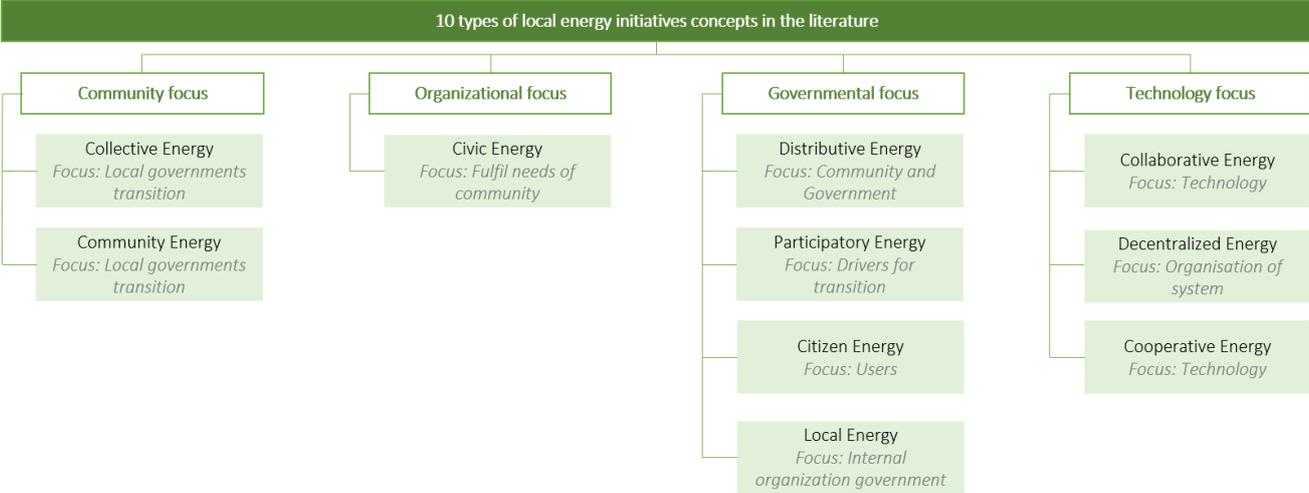


Figure 2.1 10 types of local energy initiative concepts in the literature (own illustration)

2.1.1 Community focus

In the category of community-focused initiatives, the energy transition initiatives are started by citizens. In literature the related energy initiatives are collective and community energy. These initiatives aim to establish renewable energy projects in their community (Schmid et al., 2020). Within these initiatives, the relation to a specific location is truly important and therefore is this type of initiative highly context-specific (Schmid et al., 2020; B. Warbroek & Hoppe, 2017).

There are two main reasons for starting such an initiative. First of all, collective energy initiatives reason that local governments will not invest in sustainable energy when there is no incentive in the form of energy initiatives. For local governments to invest in sustainable energy, the benefits must be larger than the costs of stimulating these initiatives (Yi et al., 2017). This type of initiative is politically driven combined with an aspiration of generating renewable energy (Kunze & Becker, 2015). Secondly, besides the desire to stimulate the local governments to invest in renewable energy, the political motivation of these energy initiatives is directed to an organisational structure in which citizen participation and collective decision-making are taken into account. In short, collective energy aims for a social and sustainable transformation at the same time. This transformation is in line with the concept of degrowth. Degrowth suggests a society in which energy is decentralized and renewable, and where energy consumption is reduced (Kunze & Becker, 2015).

The willingness to create a participating environment, in which citizens can initiate ideas and innovations to create a system of renewable energy resources, is in line with the concept of community energy initiatives (Seyfang et al., 2014). The current government organisations are not designed to cope with this bottom-up approach, and structural modifications need to be applied. Therefore, in for example Great Britain, community energy is defined by restructuring government structures (Markantoni, 2016).

To be able to collaborate with the local government, the energy initiatives have to organise themselves in local energy cooperatives. The drivers for starting the initiatives can be found as well in the seven principles of organising local energy cooperatives (EnergieSamen, 2002):

1. Democratic control by members
2. Open and voluntary membership
3. Economic participation by members
4. Autonomous and independent
5. Education and information distribution
6. Collaboration between multiple initiatives
7. Attention to the community

In general, the rise of community initiatives and local energy cooperatives is an interesting development for municipalities because the municipalities share the same objective of starting an energy transition (Aartsen et al., 2018; Gemeente Eindhoven, 2016; van der Geld, 2019). The citizen participation is beneficial to the realisation of these current energy policy goals (Schmid et al., 2020). Local embeddedness is an important aspect to the community initiatives to become a success in the Netherlands. Reason for this is the fact that municipalities are on an accessible level for interaction for citizens and may be able to act as a connection between top-down policy and bottom-up initiatives (Schmid et al., 2020; B. Warbroek & Hoppe, 2017). Besides that, municipalities are more able to endorse the local context than national and regional authorities (Oteman et al., 2017). Due to the cooperative principles and legal structure, some municipalities are willing to collaborate with community initiatives (Schmid et al., 2020). Within this collaboration, a high level of top-down support is needed (Markantoni, 2016). Developing a community-focused initiative requires several types of resources. The number of resources and their ratio differ per project to make it a success (Seyfang et al., 2014).

Overall, there are multiple drivers for citizens to start an energy initiative. It seems that the success of these initiatives is highly dependent on the collaboration with local governments and the amount of support they may receive. When supported in the right way, the outcome of the initiatives may have an influence on the energy domain by the generation and distribution of renewable energy.

2.1.2 Organisational focus

The organisational focus is defined by civic energy and is characterized by an organisation who is willing to establish a decentralised infrastructure to produce and use renewable energy. The initiatives are all different. Therefore, the organisation, outcome, and characteristics are highly diverse (McGovern & Klenke, 2018). In the Netherlands, the arrangement of social, symbolic, and technological development is the core of civic energy initiatives. The initiatives are founded by organisations, although, for the technological knowledge professionals are needed (De Vries, Boon, & Peine, 2016). The process of civic energy suggests a framework to manage the local initiatives in which the needs of the community are being fulfilled. The organisation of a strong civic energy initiative depends on the approach of combining both 'market logic' and 'community logic' (McGovern & Klenke, 2018). The 'community logic' is in line with the local embeddedness of community-focused initiatives. Therefore, it can be stated that collective energy is related to community focussed energy initiatives and its characteristics (Kunze & Becker, 2015).

2.1.3 Governmental focus

Besides communities and organisations, governments are starting energy transition initiatives as well. Four different types of energy initiatives may be distinguished in the literature, which all have another focus; distributive energy, participatory energy, citizen energy, and local energy.

First of all, governments are more able, than communities and organisations, to establish a decentralisation of the current centralized energy system. Due to their network, there are possibilities to collaborate with utilities towards the distribution of renewable resources. One of the governmental focused initiatives, distributive energy, is defined by a local renewable energy resource that provides users of their energy needs (Batz, Relf, and Nowak 2018; Moroni et al. 2018). The focus of these distributed energy initiatives is mainly on solar and wind power. Growth in these types of renewable energy asks for a revision of the current energy infrastructure, in which energy is transported over a long distance. Distributive energy asks for a new infrastructure which is more decentralised. These energy initiatives and the decentralised infrastructure offer some benefits to meet the need of users, such as; controlled energy production, invulnerable infrastructure, and better protection against natural and human disasters (Newman et al., 2017).

Another type of governmental focused initiative describes the decentralisation of the current energy system as well (Capaccioli, Poderi, Bettega, & D'Andrea, 2017). However, in participatory energy initiatives, the municipalities are focused on the drivers of the energy transition participants. Previous cases, in the cities of Vaxjo in Sweden and Sonderborg in Denmark, show that the driver per energy initiative differs. The main driver in the city of Vaxjo was climate change, where the main driver in Sonderborg was more focused on the local creation of employment (Corsini et al., 2019). For the municipality, the identification of the drivers and the potential differentiation in these drivers are important to establish and develop an energy initiative (Moallemi & Malekpour, 2018).

In the concept of citizen energy, the focus of governments is on the realization that the energy transition cannot be executed without citizens. Outcomes of citizen energy initiatives are expected to vary from expanding citizen knowledge about the energy transition to participating in local initiatives (Paulos & Pierce, 2011). Despite their willingness, citizens are not always aware of the possibilities within the policies of governments. For the governments, it is important to frame their information and possibilities and engage the citizens in an early stage of decision-making (Pidgeon, Demski, Butler, Parkhill, & Spence, 2014). The organisation of citizen energy is based upon a relationship which goes beyond the current producer-consumer relationship towards a more sustainable relationship in which citizens can participate (Van Cutsem et al., 2020).

Besides all other stakeholders, such as utilities, citizens, and participants of energy initiatives, the mayor of a municipality has an important role regarding the energy transition as well. Instead of waiting, the concept of local energy described that the mayor is supposed to act as a policy entrepreneur (Young & Brans, 2017). For the mayor to be the decision-maker in this process, it is important to be supported by the municipal council. The problem in terms of decision-making is caused by the policy that is already defined. Governments are trying to hold on to the written policy and are attempting to identify the best possible initiatives to execute following their written policy (Marinakis, Doukas, Xidonas, & Zopounidis, 2017).

In short, the municipality has the authority and the network to establish an energy transition and there may be various drivers for the municipality to initiate an energy transition project. However, for the establishment and execution of the project, the participation of citizens is necessary. For initiating these projects, the mayor and responsible officials may have to develop a vision and execution plan regarding the energy transition.

2.1.4 Technological focus

The introduction of energy initiatives is closely related to innovations in technology, which are initiated by developers. The technology gives citizens the freedom to use and share their generated energy (Hentschel et al., 2018). Upcoming technological innovations regarding renewable energy are becoming affordable and therefore, citizens are willing to generate and share their energy (Adil & Ko, 2016). All technology-focused initiatives aim at a decentralised system in which generated energy is being distributed. The current centralized energy system is not able to distribute the fluctuating amount of renewable energy supplies (Dóci et al., 2015). The focus within the technological focused initiatives is on lowering the peak-to-average ratio of the collaborative demand and to transport the generated energy to an energy grid. Besides that, guarding privacy and scalability of the technologies are important (Rajasekhar et al., 2019). There are advantages to a decentralised system over a centralized energy system, as stated within the concept of distributive energy; zero greenhouse emissions, lower vulnerability of infrastructure, more secure network, and stimulation of social sustainability (Adil & Ko, 2016). Until the establishment of a decentralised energy system, especially cooperative energy, technology makes it possible to transfer the surplus of the generated energy to an aggregator who trades the into the centralized power grid (Wang et al., 2018).

2.1.5 Local energy cooperatives

There seem to be several types of initiators for projects regarding the energy transition; communities, organisations, governments, and developers. Where the initiator, focus and drivers of the initiative might be different, in the end, they all aim for contributing to the energy transition. Each type of initiator has its methods and tools to realise their objectives. Therefore, their dependence on other parties in practice differs. The government-focused initiatives are largely dependent on the relationship between governments and network operators. In this research, the focus is on the collaboration between community-focused initiatives and governments. This relationship is assumed to be important for the realisation of community-focused initiatives. By stimulating this type of initiatives, municipalities can accomplish their energy transition objectives. In this research, the focus will be on the initiatives and cooperatives started by communities.

2.2 COLLABORATION

Collaboration can be described as multiple parties working together towards a common goal by actively working together, interacting, negotiating, and sharing knowledge and strategy. It differs from cooperation in which all parties share the same goal as well, but the parties individually work towards that goal following their strategy (Barbour, 2018). In this research, a successful collaboration represents the realization of the project of the local energy cooperative and attaining the operation stage of Figure

2.2 (Haggett, Creamer, Harnmeijer, Parsons, & Bomberg, 2013). Several components will influence the collaboration between actors. A collaboration arrangement and aiming for the same goals are important components for the collaboration between two parties (De Ridder & Noppen, 2009). The right side of Figure 2.2 explains the process components that lead to the establishment of a collaboration. The *past* influences the collaboration by the relation that may already exist. The goals of the actors are represented in the *desired future*. The past and the desired future should be familiar to the involved actors. These components are of interest during *the negotiation*. During the negotiations, *trust* should be established. Besides the past and the desired future, it is important for the actors to understand each other's attitude and culture to be able to reinforce trust. Within the *agreement* actors reach for consensus about the obligations, objectives, responsibilities, term, and costs of the project. After the agreement, the *implementation* will take place. During the implementation the trust between the actors is key (De Ridder & Noppen, 2009).

The right side of Figure 2.2 explains the different project stages and its most important aspects. These project stages are positioned next to the components of collaboration. The process of project development in community-focused initiatives can be distinguished in four stages; conception stage, feasibility stage, planning stage, and operation stage. In the *conception stage*, citizens are starting the initiative (Bush et al., 2017; Haggett et al., 2013). The drivers for these local energy cooperatives differ from economic reasons to sustainability and autonomy (Corsini et al., 2019; Haggett et al., 2013). The conception stage is followed by the *feasibility stage*, in this stage, most of the declined projects fail. In this feasibility stage, the project becomes more detailed, and the component of trust starts to develop. During the *planning stage*, the support from other parties becomes more important. The role of the municipality may turn into being essential in the form of providing knowledge, contacts, and sharing visions (Haggett et al., 2013; Warbroek, 2019). The generation and distribution of renewable energy or the execution of the project take place in the *operation stage*. In this stage, an agreement on the planned activities will be implemented. Still, there is a need for support from the municipality in the form of access to land and grid to execute the activities (Haggett et al., 2013).

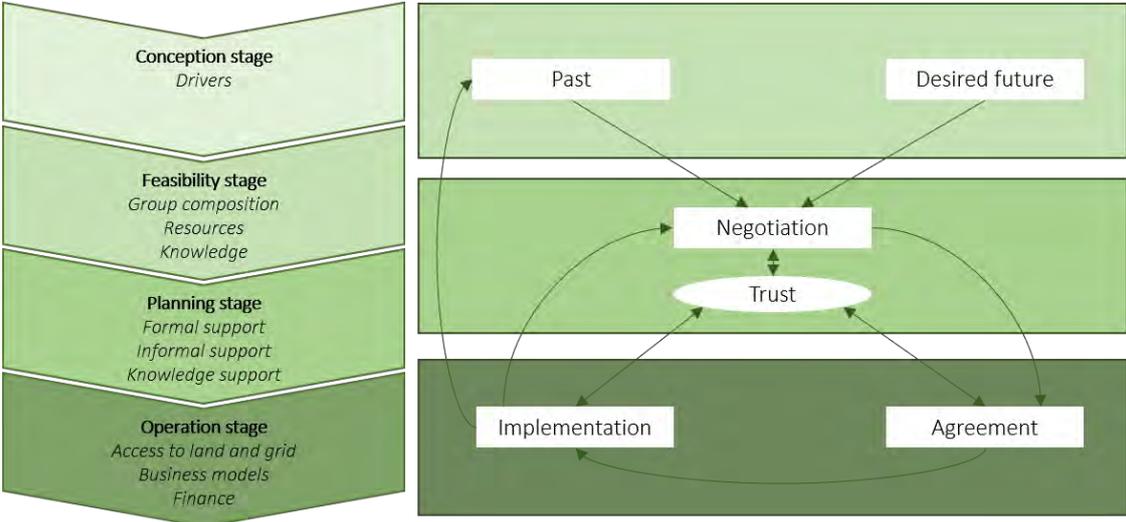


Figure 2.2 Project stages of community-focused initiatives combined with the process model for collaboration (adapted from Haggett et al., 2013; De Ridder & Noppen, 2009)

Due to the importance of local embeddedness and the willingness of establishing an energy transition, municipalities are the designated party to collaborate with local energy cooperatives. The local energy cooperatives cause support among citizens as well, this can be advantageous for the municipality in executing their policy (Schmid et al., 2020). For establishing a sustainable collaboration, it is important to be informed about the other parties background (De Ridder & Noppen, 2009). It should be made

clear that the collaboration between the government and local energy cooperatives may depend on the local institutional environment. The socio-economic situation of the country and the level of connection between the government and citizens are components in the 'institutional fit' of a country and contribute to the local embeddedness of the local energy cooperatives (Oteman et al., 2017). Local rules, norms and values, and the geographical environment may influence the development of the local energy initiative and the collaboration between the parties involved (Koehrsen, 2017). In the Netherlands, the energy policy has been subjected to discontinuity. This results in a relatively low contribution of renewable energy in comparison to other countries, such as Denmark and Germany (Oteman et al., 2017). It is stated that the dimension of the city in which the initiative takes place has an influence as well. Within smaller cities, it seems to be more manageable to support local energy cooperatives. Regardless of the size of the city, sharing knowledge and support within a network of multiple municipalities may strengthen the impact of local energy cooperatives (Hoppe, van der Vegt, & Stegmaier, 2016).

Trust, getting familiarised with each other, and knowledge sharing seem to be important aspects for the establishment of a sustainable collaboration. The size of the city and its institutional fit have an influence as well. All these aspects have to be taken into account in the remainder of the research.

2.3 GOVERNANCE ARRANGEMENTS

Municipalities are on an accessible and approachable level of government for the local energy cooperatives and the energy cooperatives are locally based and able to meet the legal restrictions (Schmid et al., 2020; Warbroek & Hoppe, 2017). Therefore, a collaboration between municipalities and local energy cooperatives is preferable (Creamer et al., 2018; Schmid et al., 2020). Governance arrangements can facilitate the collaboration between governments and these citizens by developing shared rules and resources to address the societal challenges (Arnouts, Kamphorst, Arts, & Van Tatenhove, 2012).

In the literature, a turn, defined as 'governance', arises to overcome the barriers within the collaboration between governments and citizens (Markantoni, 2016; Moallemi & Malekpour, 2018). The term 'governance' is defined by the government laying down the law, which other actors have to obey, transforming into the government sharing their influence on decision-making processes with non-governmental actors (Hasselman, 2017; Wolf et al., 2020). There is a difference between the participation of citizens and governance. Participation of local energy cooperatives indicates the involvement of these initiatives in the decision-making process. Governance suggests the involvement of local energy cooperatives to affect the outcome of the process. This involvement includes more than just decision-making, it applies to early involvement of citizens in the overall process (Wolf et al., 2020). The term 'governance' is characterized by both actors being open and transparent (Braun & Schultz, 2010). Governance arrangements are defined as the consistent combination of instruments, processes, and networks as shown in Figure 2.3. Instruments within these arrangements represent the possible tools for the government to execute their policy, subsidies for example (Howlett & Rayner, 2007). Within this consistent combination of components, the energy transition should be defined and policy should be elaborated, and for example, the role of each involved actor is determined (Vink & Dewulf, 2015). This required consistency in governance arrangements is proved to be complex in the case of urban governance (Haarstad, 2016). Governance arrangements offer opportunities for governmental and non-governmental actors to collaborate. However, changes in the existing arrangements have to be made, because currently the development of local energy cooperatives is being hindered by the governance environment (Warbroek, 2019). Current governance arrangements seem to be complex and contradicting because the instruments are accumulated through time instead of being revised in case the conditions changed (Howlett & Rayner, 2007). Besides that, the legal frameworks of the governments do not fit the bottom-up initiatives, such as local energy cooperatives. The legal

frameworks need to be reformed to stimulate local energy cooperatives and establish an energy transition (McGovern & Klenke, 2018).

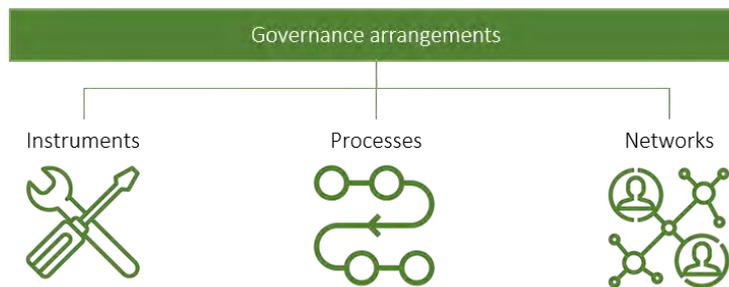


Figure 2.3 Components of governance arrangements (own illustration)

There are several reasons for introducing a new governance arrangement for the collaboration between the municipality and a local energy cooperative. First of all, governance arrangements that fit the current environment of local energy cooperatives and municipalities collaborating become more relevant because the current arrangements withhold the energy transition to persevere (Adil & Ko, 2016; Ruhlandt, 2018). Secondly, currently, governments still prefer larger companies over local energy cooperatives. Therefore, the local energy cooperatives do not have an equal position during negotiations (Strachan, Cowell, Ellis, Sherry-Brennan, & Toke, 2015). The benefit of governance arrangements is that the local energy cooperatives will be perceived as actors, by the municipality, instead of consumers (Schmid et al., 2020). Thirdly, governance arrangements may offer opportunities to create arenas in which more types of power may be used, such as resources in terms of knowledge and network. These other types of power may not only be available to the municipality but to the local energy cooperatives as well. This may result in an arrangement in which both the municipality and the local energy initiative are able to learn, evolve and reach consensus (Wolf et al., 2020). Therefore, the municipality can effectively implement its policy by enabling the local energy initiative and the local energy initiative can realize their ambitions (Schmid et al., 2020; Wolf et al., 2020). Fourthly, collaborating with local energy cooperatives may be valuable for municipalities to test new technologies and new types of governance arrangements. Besides that, it may provide support from the citizens instead of receiving NIMBY (Not In My Backyard) responses to their energy transition ambitions. By supporting local energy cooperatives, private homeowners become more involved in the energy policy of the municipality (Oteman et al., 2017). Lastly, a new governance arrangement can offer circumstances for creating shared visions and sharing knowledge (Koehrsen, 2017). The arrangements are not solely able to treat external barriers, they offer possibilities as well for internal struggles of local energy cooperatives by aligning their visions, sharing knowledge with people with other social backgrounds, and the ability to coordinate their activities. By agreeing on ways of working and all aiming to establish an energy transition, people with various backgrounds and opinions can collaborate without denying their background (Koehrsen, 2017).

Besides the benefits for the construction and implementation of a new governance arrangement, there are difficulties as well. First of all, the empowering effect of governance arrangement for the involved parties may be accompanied by a restricting effect. The government imposing a role for the participating local energy initiative may appear as a prerequisite for collaborating. This imposed role may limit the local energy cooperatives to be innovative and experiment with other approaches to realize their goals (Koehrsen, 2017). However, a new form of governance arrangement should support the participating citizens instead of imposing restrictions (Braun & Schultz, 2010). Secondly, it should be endorsed that the applied governance arrangements should conform to the current changing policy environment. Currently, citizens initiate projects and the policy environment demands the government to be more supportive to bottom-up initiatives. Therefore, the involved parties need to adjust to this dynamic environment and closely collaborate to realize their sustainable ambitions. The question rises whether

governments can accommodate to this new form of governance and its dynamic character (Markantoni, 2016). Third of all, the policy arranged by the government does not necessarily offer the desirable execution of the policy as well, and therefore it may be difficult for the municipality to make decisions despite a new governance arrangement (Wolf et al., 2020). Lastly, for local energy cooperatives is funding an important resource for executing their activities. Most of the funding for the energy transition comes from national and European governments. Municipalities have to take the policies of national and European governments into account in order to claim this funding, and may, therefore, be less flexible in adapting their policies (Wolf et al., 2020). The reasons for and difficulties in developing a new governance arrangement are summarised in Table 2.1.

Reasons for a new governance arrangement	Difficulties for a new governance arrangement
Current arrangements withhold the energy transition	Imposed role within the arrangement may limit innovation
Citizens may be perceived as actors	Uncertain if the municipality can conform to the potential dynamic character of the arrangement
Both actors can learn and negotiate to reach consensus	The arrangement does not automatically offer plans for the execution of the policy as well
Private homeowners become more involved in the energy policy	The municipality has to take (inter)national policies into account
Creation of shared visions and sharing knowledge	

Table 2.1 Reasons and difficulties for new governance arrangements

Several aspects need to be taken into account for the development of a new governance arrangement. It is important to accept the different role of local energy cooperatives in these arrangements. Despite the national and European policies, local energy cooperatives may still influence defining the energy policy within the municipality and, especially, may be able to address complications in the execution of the policy and implementation of the energy transition technology (Schmid et al., 2020). Coherence in the collaboration is important for establishing governance arrangements (Haarstad, 2016; Vink & Dewulf, 2015). Therefore, it is beneficial that both municipalities and local energy cooperatives do have some overlapping ambitions regarding renewable energy. By doing this, municipalities develop sustainable policies and local energy cooperatives can produce and distribute renewable energy (Hufen & Koppenjan, 2015). In addition, financial support, vision and knowledge sharing should be part of the arrangement, and the formal and informal guidelines of the system should be clarified. Each of the addressed aspects is a parameter in a governance arrangement (Oteman et al., 2017). To be able to provide in this parameters the local government should have adequate financial resources and a certain level of autonomy, relative to other governments and parties, to support their citizens (Schmid et al., 2020). Koehrsen (2017) endorses the importance of social aspects in the arrangements because this will stimulate the collaboration between parties with different backgrounds, in this case, municipalities and local energy cooperatives. Encouraging the debate between municipalities and local energy cooperatives and willingness to learn together may reduce friction within governance arrangements (Wolf et al., 2020).

Since a couple of years, municipalities are exploring how to answer to the demand of new governance arrangements, balancing the facilitating role of collaborating with bottom-up initiatives and the stimulating role of activating citizens to generate renewable energy (Warbroek, 2019). While adjusting the current governance arrangements, it is important to endorse that the arrangements support both governmental and non-governmental actors to collaborate (Aylett & Alexander, 2014; Beunen, van Assche, & Duineveld, 2015). Darius (2020) states that an active role of the municipality increases the development and the level of success of the energy initiative. It has been proven that municipalities have an effective impact on the execution of local initiative ideas. Not by being the regulator, but more as a collaborative supporter and by being the enabler of the modes of governance (Schmid et al., 2020). For the government there are four modes of governing in local energy transition policy; self-governing,

governing by provision, governing by authority, and governing through enabling. Self-governing implies a focus on governing their own activities. When the municipality is governing by provision, the municipality provides services for the direct use of renewable energy. Governing by authority can be described as the imposition of rules by the government towards citizens and organisations. In the governing through enabling mode, the government arguments for renewable energy instead of imposing it. These modes of governing and their related actions are shown in Figure 2.4 (Bulkeley & Kern, 2006).

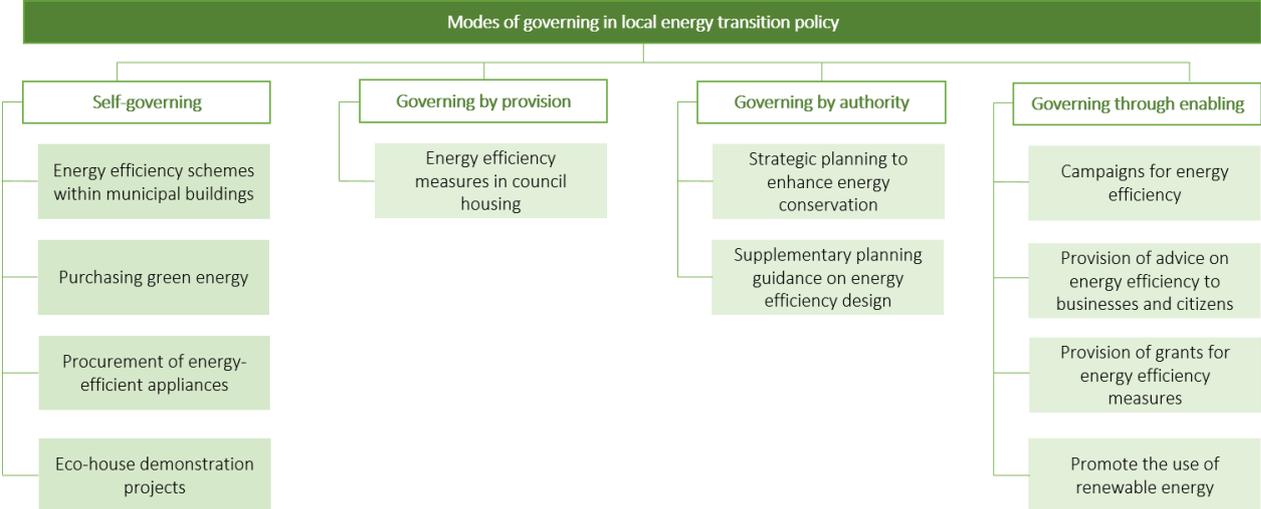


Figure 2.4 Modes of governing in local energy transition policy (adapted from Bulkeley & Kern, 2006)

The mode of governing in local energy transition policy that is applied in the collaboration between municipalities and local energy cooperatives might differ (Bulkeley & Kern, 2006). For this research, an assumed mode of governing is selected following the selection criteria of Table 2.2. The criteria are ranked following their importance.

Criterion	Reason for criterion
<i>Focus on collaboration</i>	Following the problem statement, the perspective should focus on collaboration.
<i>Focus on knowledge sharing</i>	Following the problem statement, the perspective should focus on knowledge sharing.
<i>Connection to the energy transition</i>	Following the subject of the research, experience using the perspective in the energy transition is useful.

Table 2.2 Selection criteria for a mode of governing

In the study of Warbroek & Hoppe (2017), the challenge seems to be to find the equilibrium between governing by authority and governing through enabling. Reason for that, it requires action and potential interaction from the citizens. Collaboration with citizens is not needed in other modes of governing. Schmid et al. (2020) have studied German and Swiss local energy cooperatives. These cooperatives mainly collaborate with local governments who govern through enabling. This governing through enabling implies a supportive and collaborative role for the government towards the local energy cooperatives. This mode of governing is based on the incentives of both parties, instead of imposing actions from a higher authority level. The selection of the mode of governing is shown in Table 2.3.

	Self-governing	Governing by provision	Governing by authority	Governing through enabling
<i>Focus on collaboration</i>	-	+	-	++
<i>Focus on knowledge sharing</i>	+	+	+	++
<i>Connection to the energy transition</i>	++	++	++	++

Table 2.3 Mode of governing selection

Besides the modes of governing, there are several instruments the government can use within the governance arrangements. These instruments can be divided into soft and hard steering. Soft steering consists of giving direction and connecting. An example of giving direction is assisting in developing policy goals, acting as an intermediary is an example of connecting. On the other side, hard steering comprises regulating and stimulating. Regulating can be described as the application of regulations to attain policy goals. In the case of stimulating, subsidies for executing activities which contribute to the policy goals will be provided (Verheul, Daamen, Heurkens, Hobma, & Simon van Zoest, 2019).

In short, governance arrangements may support and facilitate the collaboration between the municipalities and the local energy cooperatives. There are several modes of governing that can be applied in these arrangements. The governing through enabling mode of governance stimulates the interaction between the local energy cooperatives and the municipalities and focusses on knowledge sharing.

2.4 INTERMEDIARIES

It is important to address that there are more key actors within the governance arrangement than solely the municipality and local energy initiative (Markantoni, 2016). Energy companies and banks may have a stake in realizing the energy transition. However, in this case, energy companies and banks prefer collaborating by a formal partnership instead of a governance arrangement (Schmid et al., 2020). For the alignment within a governance arrangement and connections to the key actors, intermediary organisations may be beneficial. These organisations already exist in other areas of collaboration and may fulfil several functions within governance arrangements: link parties to each other; mediating between parties; support common goals; support knowledge sharing (Creamer et al., 2018; Hoppe & Van den Akker, 2014; Lacey-Barnacle & Bird, 2018; B. Warbroek, Hoppe, Bressers, & Coenen, 2019; B. Warbroek, Hoppe, Coenen, & Bressers, 2018)

In the problem statement, three barriers are identified: (1) the attitude of the municipality, (2) group dynamics and composition of the local energy initiative, and (3) ignorance. Warbroek et al. (2019) state that a connection with intermediary organisations might be a component for the success of local energy cooperatives. Intermediary organisations may, first of all, be beneficial in internally arranging the local energy initiative (Warbroek et al., 2018). Besides that, within projects, it seems difficult to abstract the knowledge and possible lessons to improve the following projects. Intermediaries appear to be the designated party to fulfil this responsibility and to prevent parties for reinventing the wheel for every new project (Seyfang et al., 2014). In addition to the lack of knowledge, due to their experience, these organisations might be more informed about the economic advantages of the energy transition. Besides that, intermediaries might be more informed about opportunities for funding the initiative (Lacey-Barnacle & Bird, 2018). A connection to the different types of governments (local, regional, and national) makes it more simple to negotiate and to align with their agendas and policies (Lacey-Barnacle & Bird, 2018). An overview of all types of roles and activities for intermediary organisations is shown in Figure 2.5. The facilitating role and the attempt of aggregating knowledge, focus on building capacity within the local energy cooperative. The role of brokering is to mitigate potential barriers. The final three roles are intended to open up the existing system to local energy cooperatives.

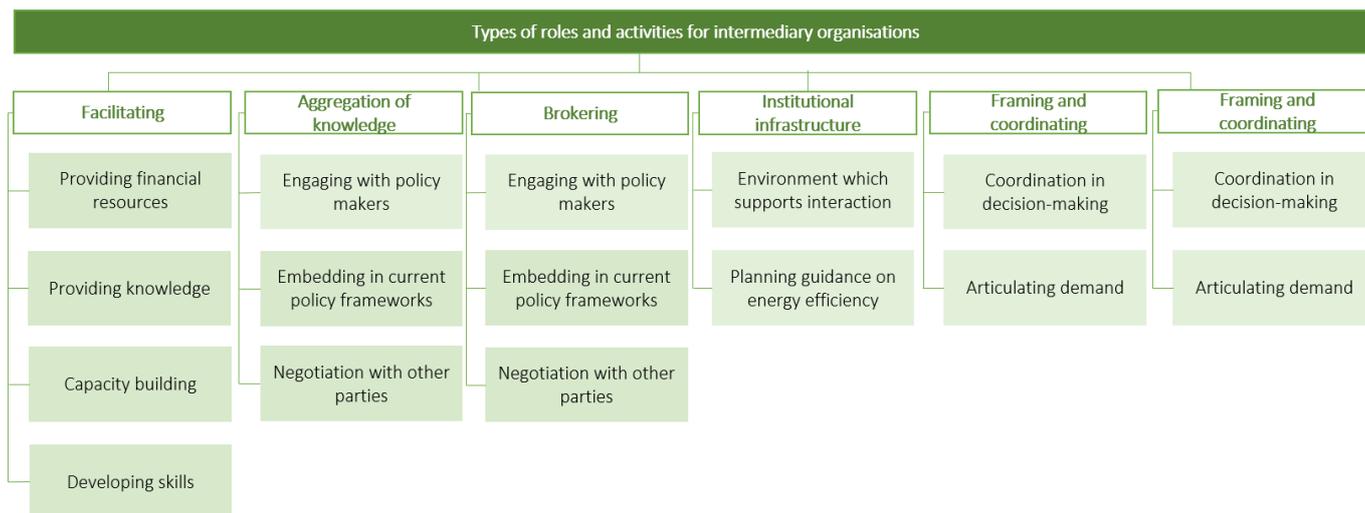


Figure 2.5 Types of roles and activities for intermediary organisations (abstracted from Warbroek, 2019)

Besides the advantages of involving intermediary organisations in the collaboration, there are disadvantages as well. In the beginning, the involved intermediary organisation needs time to be able to provide resources and support. As a consequence of this lack, the organisations might, in the beginning, not be able to meet the needs of the local energy cooperatives and municipalities. Due to changing policies, it can be complicated for the intermediary organisation to provide the correct information and to establish, together with a local energy initiative, a successful project (Seyfang et al., 2014).

In the literature, multiple times the intermediate role of the municipality is endorsed instead of involving a separate intermediary organisation (de Bakker et al., 2020). Warbroek et al. (2018) state that an enabling mode of governing for the municipality coincides with a role as intermediary. The advantage of the municipality as an intermediary organisation is that they can rely on their trustworthy identity (Creamer et al., 2018). Darius (2020) recommends municipalities to act as an intermediary as well, especially between local energy cooperatives and higher-level governments regarding policy and funding. The network of connections of the municipality can be used for creating awareness among citizens, about the activities of local energy cooperatives (Lacey-Barnacle & Bird, 2018).

2.5 PERSPECTIVES ON TRANSITION

Despite the awareness, the implementation of sustainable innovation is lacking (Kemp, Schot, & Hoogma, 1998). The development and implementation of innovation are complicated because there is no defined end-state or roadmap (Kemp, Rotmans, & Loorbach, 2007). The undefined roadmap is caused by the uncertainty in the process of new technological innovations (Markard, Stadelmann, & Truffer, 2009). There are theoretical perspectives on transition that attempt to understand this process of innovation. In the scientific literature, four theoretical perspectives on transition can be distinguished; Strategic Niche Management, Multi-level Perspective, Technology Innovation System and Transition Management (Markard, Raven, & Truffer, 2012). In the literature regarding these perspectives on transition, it is stated that sustainable innovations seem to be non-linear and complex to fundamentally implement (Hölscher, Wittmayer, Avelino, & Giezen, 2019). The aim of the selected perspective on transition should include the governance perspective and the support from the public and private parties (Falcone, 2018).

For this research, a transition perspective will be selected and its insights will be used during the rest of the research to understand the complexity of implementing innovation and solutions. For selecting a perspective on transition, three criteria have been distinguished for the selection of the perspective on transition in Table 2.4. These are similar to the selection criteria of the mode of governing. The criteria are ranked following their importance. The perspectives on transition are discussed following the stated criteria.

Criterion	Reason for criterion
<i>Focus on collaboration</i>	Following the problem statement, the perspective should focus on collaboration.
<i>Focus on knowledge sharing</i>	Following the problem statement, the perspective should focus on knowledge sharing.
<i>Connection to the energy transition</i>	Following the subject of the research, experience using the perspective in the energy transition is useful.

Table 2.4 Selection criteria for perspectives on transition

2.5.1 Strategic Niche Management

Strategic Niche Management focusses on learning from societal experiments, managing expectations, and network building for realising a change in a system (Falcone, 2018; Hoppe et al., 2015; Kemp et al., 1998). These societal experiments are taking place within small niches to research the outcomes, before implementing the innovation on a considerable scale (Ruggiero, Martiskainen, & Onkila, 2018; Walrave, Talmar, Podoyntsyna, Romme, & Verbong, 2018). These small projects are part of the learning for other projects by determining necessary conditions which influence the robustness of the innovation (Seyfang et al., 2014). The aim of the experiments is two-fold. First of all, the experiments are used to learn more about the value of innovation. Secondly, conditions for development and implementation are stimulated (Kemp, Schot, et al. 2007; Seyfang et al. 2014). The results of the experiments are used for gaining insights for a proper implementation in the existing structures and organisations in society (Kemp et al., 1998). During the experiments the creation of collective knowledge and the possibilities to diffuse the innovation as much as possible are central. By gathering collective knowledge, the option for inter-local learning is being created. This inter-local learning offers lessons for other projects in local contexts (Walrave et al., 2018). For local energy cooperatives, the inter-local learning between projects is important, therefore, there is room for intermediaries to strengthen this knowledge sharing by (Seyfang et al., 2014).

For the execution of the strategic niche management experiment, five steps need to be taken (Kemp et al., 1998):

1. Selection of the technology to implement
2. Setting where the experiment should take place
3. Defining the goals of the experiment
4. Experiment on a larger scale
5. Improve the independence of the technology by disassembling the protection of the experiment

The niches in which the experiments take place include multiple actors for interaction. These experiments can be described as local transitions. Collaboration between the parties within these local transitions is central in the theory of Strategic Niche Management, therefore, new types of governance may arise (Koehrsen, 2017). Enabling modes of governing stimulate the local experiments, besides that, the niches of experiments may stimulate the establishment of new governance arrangements as well (McGovern & Klenke, 2018).

The perspective of Strategic Niche Management on transition could be supportive in limiting the influence of possible barriers and implementing innovations in existing systems (Warbroek, Hoppe, Coenen, & Bressers, 2018). Warbroek (2019) states that the perspective does not provide a thorough energy transition perspective for policymakers. However, the niches of the perspective offer opportunities for sustainability transitions by not solely focusing on the technological aspect but the social aspect as well (Dóci et al., 2015).

2.5.2 Multi-level Perspective

The perspective on transition of Multi-level Perspective aims to understand the implementation of technological products into a socio-technical system and identifies to which level innovation can get implemented (Geels, 2018). The perspective describes three levels in society through which a socio-technical innovation has to break. These three levels are described as the technological niche level, socio-technical regime and sociotechnical landscape and are shown in Figure 2.6 (Geels, 2002). The Multi-Level Perspective is mostly applied to large transitions, such as the energy transition. In this perspective, it is stated that transition depends on internal and external factors and evolves. The transition can emerge by the alignment of the three described levels (Geels, 2018). For this alignment, development on the three levels is necessary (Kern & Smith, 2008).

On the lowest level, the technological niche level, the perspective of Strategic Niche Management is being used. On this niche level, technological innovation is tested within a protected niche (Geels, 2002). Changes in the first level are caused by learning processes and support from authorities (Geels & Schot, 2007). In the second level, the socio-technical regime, the focus is on the involved actors of the innovation to create new networks. The links between the different actors and groups of actors are studied (Geels, 2002). Interactions between actors may provide room for innovation from the niche level (Geels & Schot, 2007). The final level, the socio-technical landscape is about the external factors that influence the implementation of the innovation, such as economic influences and cultural values (Geels, 2002). The combination of these aspects may result in pressure on the regime and therefore cause change at the landscape level (Geels & Schot, 2007). The difference to the perspective of Strategic Niche Management is the focus on both internal and external environment, where Strategic Niche Management predominantly focusses on the internal environment (Walrave et al., 2018).

The empirical character of this perspective on transition reflects on the dynamic and complex character of the developments. However, this is not only a strength, by showing the complexity, but it is also a weakness as well. Complex reality representation, such as the energy transition, may cause non-decisiveness and lead to an increase in motivation of the involved actors (Geels, 2002).

The perspective of Multi-level Perspective researches the implementation of an innovation and reflects on this implementation. Because Strategic Niche Management is perspective on transition, it is matched to the same selection criteria. In addition, both the internal and external environment of the transition are taken into account in the perspective on transition of Multi-level Perspective (Geels, 2018). Despite that, within the Multi-level Perspective, the whole process of innovation is analysed. However, in this research, the implementation of innovation and sustainable collaboration between energy initiatives and municipalities are analysed.

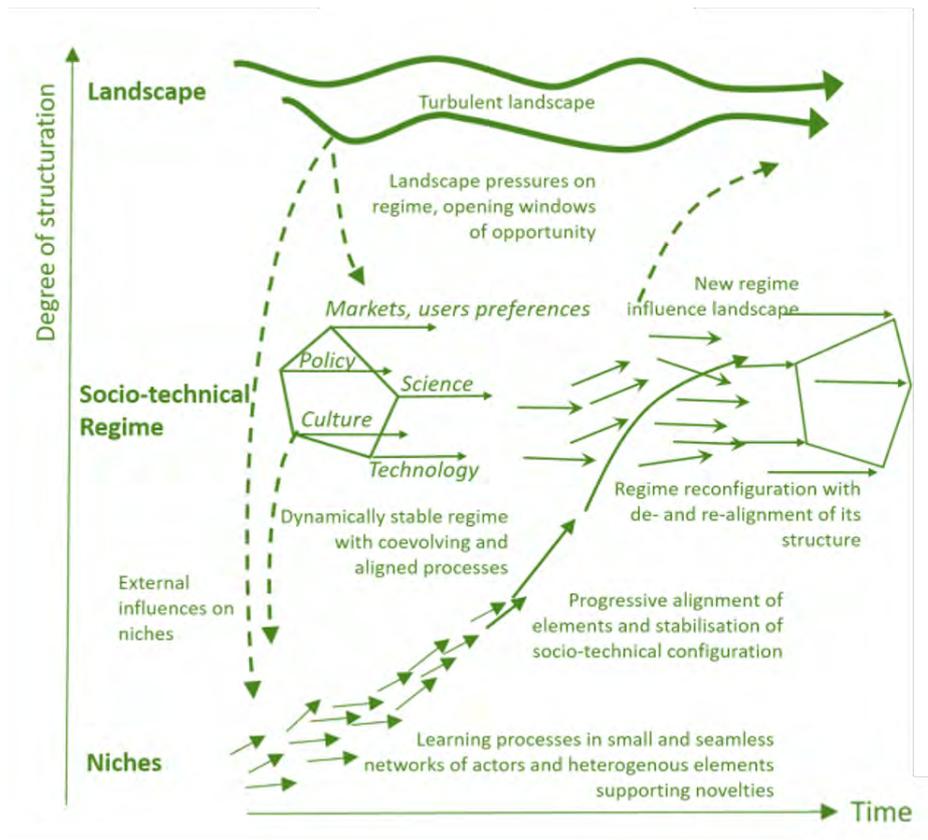


Figure 2.6 Multilevel perspective on transitions (Geels & Schot, 2007)

2.5.3 Technological Innovation System

The perspective on transition of Technological Innovation System focusses on the collaboration within a network of actors to create, distribute and implement new technologies or variant of a technology (Kanda, Río, Hjelm, & Bienkowska, 2019; Markard et al., 2009). Within the perspective of the Technological Innovation System, the hidden reason for the malfunctioning of new technology is being studied (Bergek, Jacobsson, Carlsson, Lindmark, & Rickne, 2008). The perspective states that attention should not solely be drawn to the innovation itself, but to the entire system in which the innovation takes places over time (Bergek et al., 2008; Kanda et al., 2019). In this system, attention is drawn to the involved technologies, actors, and institutions (Köhler et al., 2019). The interactions between these components are considered important for the stimulation of innovations (Kanda et al., 2019). For studying a technology innovation, the perspective provides a systemic approach which takes seven functions into account (Kanda et al., 2019; Köhler et al., 2019):

1. Knowledge sharing
2. Influence on the search direction
3. Entrepreneurial experiments
4. Market formation
5. Legitimation
6. Mobilisation of resources
7. Positive external effects

For the aspect of knowledge sharing, attention is drawn to how present knowledge is mapped and diffused within the Technological Innovation System. The influence on the search direction focuses on the interest and influence of the involved actors and institutions on technological development. Throughout the entire process of development, the component of uncertainty is present. By executing entrepreneurial experiments, this level of uncertainty can be reduced. Besides the internal actors and

institutions, the market in which technological development will be introduced is studied. The function of legitimation connects to the function of influence on the search direction. It is focused on the liability of the development in society. Therefore, actors and institutions need to be aware of the intention of their actions and their impact on society. During the evolution of the Technological Innovation System, more attention is drawn to the resources of the technological development. It needs to be mapped to what level the various resources can be obtained to foster further development. Involving new actors and institutions to the Technological Innovation System may offer positive external effects in terms of entrepreneurial experiments, market formation, and mobilisation of resources. Fulfilling the first six functions of the systemic approach may be able to support these effects. For example, the legitimacy of the development can strengthen the attractiveness for new actors and institutions (Bergek et al., 2008; Kanda et al., 2019).

Each function of this systemic approach should be executed to an agreed level of quality. By applying this approach, the perspective is suitable for the implementation of new technological development because of the focus on interaction and knowledge shared between the actors involved (Kanda et al., 2019). Researching these seven functions, it is attempted to understand the environment in which the technology takes place and the position of the technology relative to other developments (Köhler et al., 2019). Besides the technological products, it is possible to apply a roadmap on policies as well. It is assumed that policies, as well as institutions and networks, influence innovations. The focus within policies is on identifying the occurring issues within policies and defining a policy to overcome these issues (Bergek et al., 2008). The approach of Technological Innovation System can address the coordination issues of the innovation implementation and stimulate the collaboration between actors. This is possible by describing the elements of the system, and therefore all actors and their networks have to be studied and for identifying occurring issues and patterns (Markard et al., 2009). Bergek et al. (2008) state by applying the perspective on policies, the guidelines for policymakers seems to be not specific enough to implement.

The perspective of Technological Innovation System has similarities with the perspective of Multi-level Perspective. Multi-level perspective focuses on three different levels of in society: niches, socio-technical regimes, and landscape. In the Technological Innovation System, attention is drawn to the levels of niche and socio-technical regimes (Kanda et al., 2019; Markard et al., 2009). In addition, the perspective has an international character and can be implemented on a large scale (Bergek et al., 2008).

2.5.4 Transition Management

The perspective of Transition Management attempts to combine the long-term governmental policies with short-term actions and experiments, collaborating with private actors (Kemp et al., 2007). In this perspective, studies about governance and complexity are integrated (Köhler et al., 2019). New long-term visions are developed to the extent the existing policy of the government. Besides the long-term focus, the short-term focus is researched as well. The short-term focus includes investigating the options for process management (Kern & Howlett, 2009). For the options, multiple transition pathways for implementation are investigated (Kern and Smith 2008; Kemp et al. 2007).

The main characteristic of Transition Management is combining bottom-up initiatives with top-down tools. The focus is on governments and the alignment between existing policies and the implementation of socio-technical innovations (Kemp et al., 2007). The important difference to the other perspectives on transition is the creation of transition arenas. These arenas are created to bring multiple stakeholders, with different societal backgrounds, together. These transition arenas force the government to invite all types of stakeholders and create networks which foster collaboration. Within the collaboration, a process of reflection and deliberation is necessary to prevent the stakeholders from lock-in (Kern & Smith, 2008).

For this alignment, it is important to first structure the occurring problems of innovation and possible transition paths as shown in Figure 2.7. These activities are summarised as strategic activities. These activities facilitate the development of visions and strategy regarding innovation. The aim is to determine the culture in which innovation takes place. Discussions between the involved actors should provide clarity about their perspective on matters such as norms and values, sustainability, and the impact on society. Tactical activities are specified as activities to construct coalitions and networks between actors following the outcomes of the strategic activities. Within the operational activities, short-term experiments are executed. The focus is on testing and learning from the experiments. In practice, these experiments are unlikely to evolve into system innovations that influence broader policies, because of randomness and uncertainty. During the reflexive activities, the impact on society and the evaluation of the policies are monitored and assessed. These reflexive activities essential for the prevention of lock-in by the stakeholders (Köhler et al., 2019; Loorbach, 2010). The overall process of Transition Management (Loorbach, 2010).

The application of the perspective aims to reveal the structural problems that are enclosed in the existing policy to enable the implementation of socio-technical innovations (Kern & Smith, 2008). The perspective can be applied to several scales of innovation. It can be applied on a societal level, but on a single project level as well (Loorbach, 2010). To prevent innovation from lock-in, the perspective focusses on strategic activities (Schot & Geels, 2008). However, the energy transition has a dynamic character, which might be hard to translate into a policy that can deal with this in practice (Goddard & Farrelly, 2018; Kemp et al., 2007). Besides, the risk of Transition Management is the possibility of passing by the original idea of the existing policy (Kern & Smith, 2008; Rotmans & Loorbach, 2009). This can be the result of the invitation of all relevant stakeholders. It might lead to a non-decisive situation in which no progress is being realised and, in addition, causes a decrease in the motivation of the involved actors (Hölscher et al., 2019).

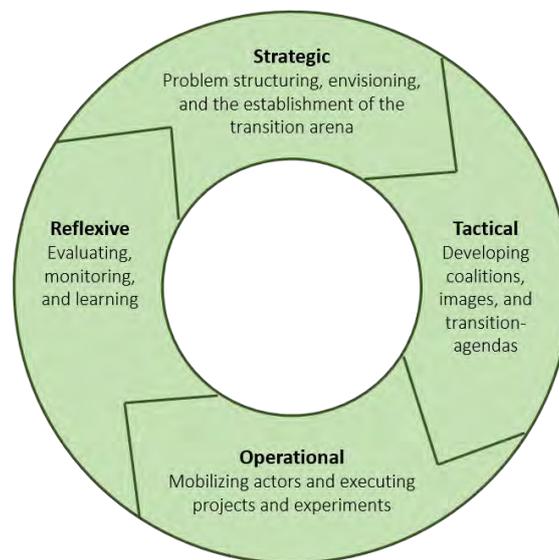


Figure 2.7 Transition Management cycle (adapted from Loorbach, 2010)

2.5.5 Perspective on transition selection

Three criteria have been distinguished for the selection of a perspective on transition. Discussing all four perspectives on transition and their application, a selection on the most applicable perspective can be made based on the proposed selection criteria. All the transition perspectives are exposed to the same three selection criteria and an overview is given in Table 2.5.

	Strategic Niche Management (SNM)	Multi-level Perspective (MLP)	Technological Innovation System (TIS)	Transition Management (TM)
<i>Focus on collaboration</i>	++	+	+	++
<i>Focus on knowledge sharing</i>	++	+-	+	++
<i>Connection to the energy transition</i>	+	+	-	+-

Table 2.5 Transition perspective selection

According to the selection, the perspectives of Strategic Niche Management and Transition Management are the most applicable for this research. In the Strategic Niche Management perspective, the focus is on small scale innovations, in which collaboration, for example with authorities, and knowledge sharing between several niches are central. These aspects coincide with the problem statement of this research. Complementary to the perspective of Strategic Niche Management, the perspective of Transition Management focus on knowledge sharing and collaboration as well. However, more attention is drawn to policies for a transition. The perspective of Transition Management stimulates the collaboration between municipalities and local energy cooperatives in established transition arenas. Within the transition arenas, it is possible to involve private actors, which offers possibilities for involving intermediaries to stimulate knowledge sharing and collaboration. The transition arenas of this perspective could offer opportunities for inviting multiple stakeholders and are similar to the niches of Strategic Niche Management.

The perspective of Multi-level Perspective incorporates the perspective of Strategic Niche Management. The extension of the Strategic Niche Management focusses on the implementation of technology in different levels of society. Before discussing the socio-technical regime and socio-technical landscape, the niche innovation of the collaboration between local energy cooperatives and municipalities should mature. Therefore, the focus should be on the internal environment before researching the external environment.

The perspective of Technological Innovation System describes the entire system and therefore corresponds to the energy transition as a whole, instead of applying to the aspect of collaboration between local energy cooperatives and municipalities. Knowledge sharing about the initiating a local energy initiative and the collaboration seems to be irrelevant. The perspective lacks to provide guidelines for policymakers, this contradicts to the enabling modes of governance and the establishment of new types of governance arrangements.

The collaboration between municipalities and local energy cooperatives could stimulate the establishment of an energy transition. The insights from the perspectives of Strategic Niche Management and Transition Management are used in this research to assess on what aspects both parties need to focus during their process and how they could contribute to the energy transition.

2.6 THEORETICAL FRAMEWORK

10 types of energy initiatives are studied in this chapter to define the differences and similarities between the available initiatives. All initiatives seem to have the aim to produce and distribute renewable energy. The differences were based on the type of initiator of the initiative; initiated by the community, initiated by the government, initiated by an organisation, and initiated for technology development. In this research, the collaboration between the government and community focussed energy cooperatives are central. The local embeddedness and support from the local governments are highly important for these cooperatives. Collaborating regarding the energy transition asks for a relationship in which local energy cooperatives can participate instead of being a consumer. For this collaboration, the municipality needs to involve local energy cooperatives early in their decisions and share their knowledge.

The collaboration between parties is influenced by several aspects; the past, the desired future, negotiation, trust, implementation, and agreement. Over time these aspects evolve during the stages of project development; conception stage, feasibility stage, planning stage, and operation stage. For a collaboration with the government in specific, the institutional fit should be taken into account as well. For the collaboration between citizens and governments in the energy transition, the governance arrangements might be applied. Within these arrangements, the instruments, processes and networks are aligned between the actors. The governance role in such arrangement should be enabling, by which the municipality is collaborative and supportive to the local energy cooperative. Subsequently, this enabling role corresponds to the role of municipality as an intermediary. A facilitating intermediary role within the governance arrangement might be advantageous for the use of their network and expertise. The energy transition could benefit from the collaboration between municipalities and local energy cooperatives. Insights from the perspective of Strategic Niche Management and Transition Management offer opportunities for understanding the role of collaboration between the municipality and local energy cooperatives in the energy transition. Within these perspectives, collaboration and knowledge sharing are central in the learning from small niches, which can be represented in the local energy cooperatives. The theoretical framework for this research is shown in Figure 2.8. This insights of this framework form the basis for the rest of the research.

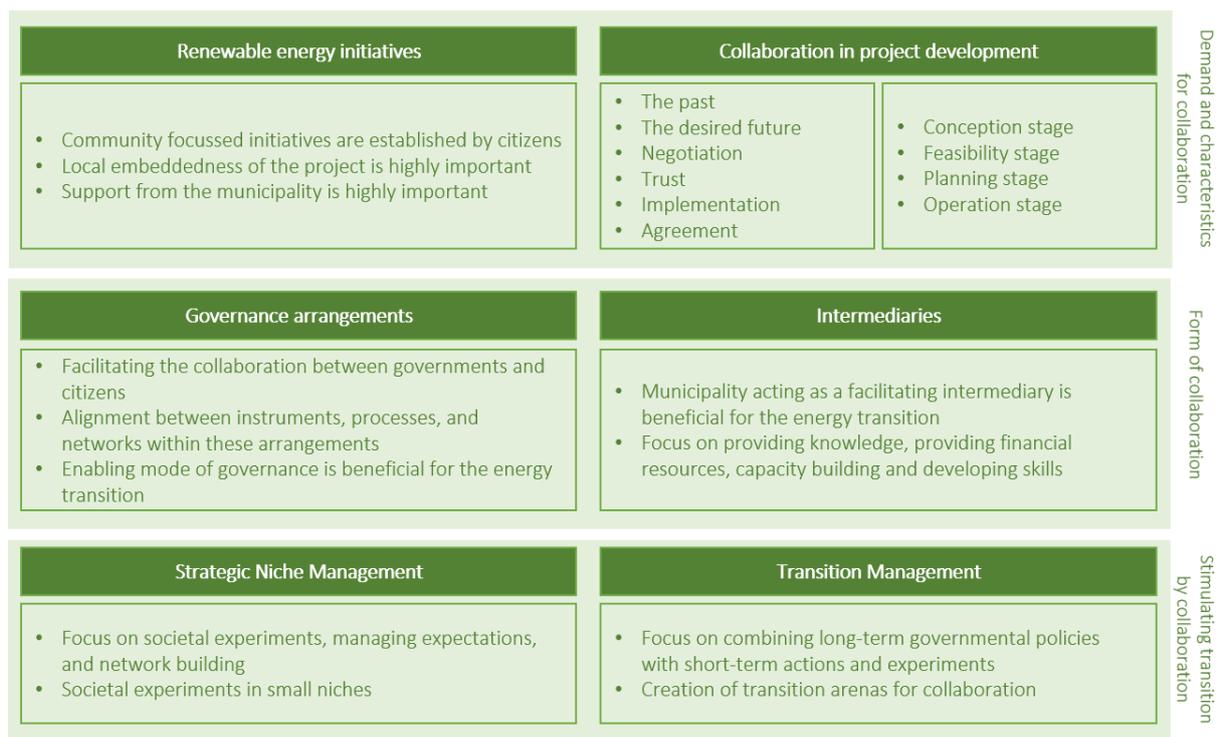


Figure 2.8 Theoretical framework (own illustration)

Methodology

Discover

Define

Develop

Deliver



In this chapter, the methodology of the research is explained. First, the research design for this study is explained. This design research has to be aligned with the stated problem statement. This design research is divided into four phases for which all the methods and tools are explained per phase. This chapter aims to answer the question: *How to capture and apply the aspects of collaboration between municipalities and local energy cooperatives?*

3.1 DESIGN RESEARCH

The technology for an energy transition is available and the involved actors are willing, nevertheless, implementation of technology and policy is lacking. A potential reason for this is a lack of sustainable collaboration between municipalities and local energy cooperatives. There are several barriers within the collaboration between municipalities and local energy cooperatives identified. The identification of these problems is a prerequisite for the application of design-oriented research. The application of design-oriented research offers opportunities to design a framework to overcome these identified barriers (Liedtka, 2013; Verschuren & Doorewaard, 2010). Design thinking is an approach for transforming the way of thinking, resulting in new forms of doing business (Tschimmel, 2012). Besides, design thinking is supposed to bring various ideas together and combine them into viable solutions (Clune & Lockrey, 2014). For developing these viable solutions, both theory and practice are reviewed. The theory is applied to understand the practice and design a solution. Therefore, the designed solution might be able to close the gap between theory and practice (Vakil, McKinney de Royston, Suad Nasir, & Kirshner, 2016).

This research aims for an intervention in the current situation regarding the collaboration between these local energy cooperatives and municipalities to stimulate the energy transition. Design-oriented research corresponds to this aim. Executing design-oriented research, first, a problem analysis is defined. The problem analysis forms the input for the development of the solution. Thereafter, the solution has to be assessed and recommendations for this designed solution has to be provided (Verschuren & Doorewaard, 2010).

Double Diamond method

There are multiple methods for using design thinking in design-oriented research. These are all applicable in specific contexts (van Boeijen, Daalhuizen, van der Schoor, & Zijlstra, 2014). In this research, the design thinking concept of the Double Diamond is applied. This method is selected for its completeness, the emphasis on divergent and convergent thinking, and the applicability in interdisciplinary groups (Tschimmel, 2012).

The method appears to solve problems in existing products and systems (Clune & Lockrey, 2014). The Double Diamond offers opportunities to analyse and frame the problem in the first diamond. For this, theory and practice are both consulted. Therefore, the researcher is driven to understand the actual problem of the research. After that, the researcher is supposed to study all possible solutions to solve that stated problem in the second diamond. For solving the stated problem, other areas and sectors are studied for gaining new insights.

The Double Diamond elaborated in four different stages; discover, define, develop, and deliver. These stages are divided into two processes of converging and diverging, which together create two diamonds. In this research, every stage has another focus and associated method and tools, this is shown in Figure 3.1 (Design Council, 2007).

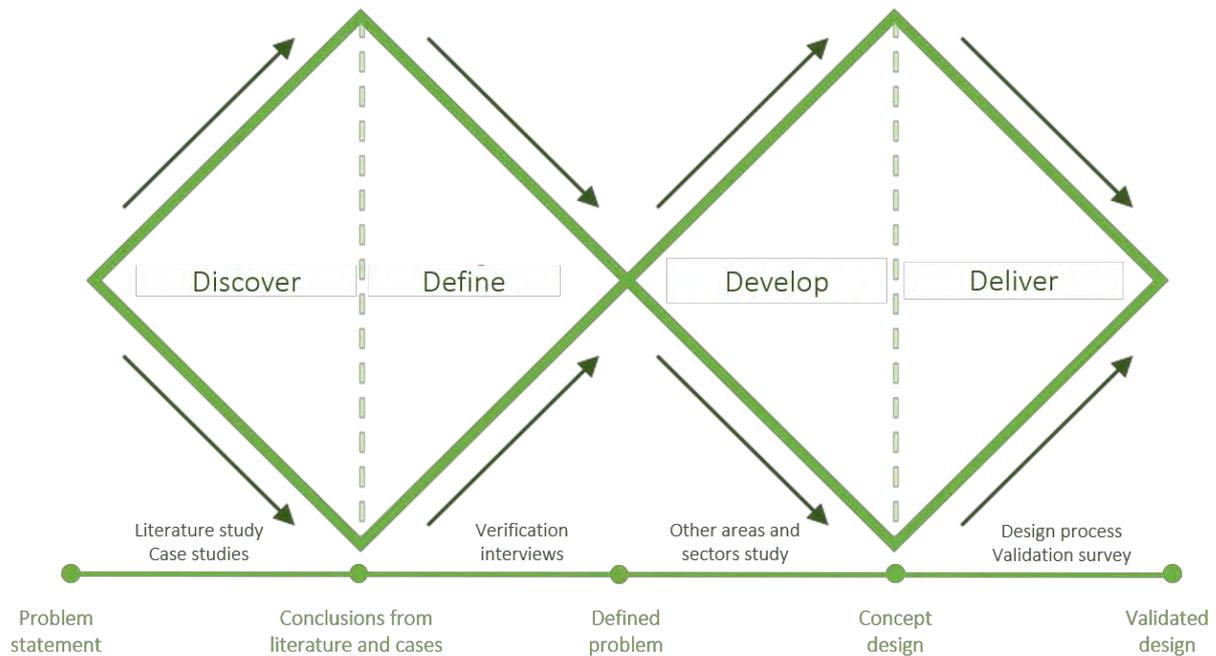


Figure 3.1 Application of the Double Diamond method (adapted from Design Council, 2007)

3.2 DISCOVER-PHASE

During the first phase, the Discover-phase, the problem is analysed. During this analysis, the current situation regarding the collaboration between municipalities and energy initiatives is studied. At the end of the Discover-phase, the problem statement of this research includes more underlying information by conclusions from the literature study and the empirical research.

Literature study

This first phase includes the outcomes of the literature study of chapter 2 and empirical research. The literature study is focussed on the collaboration between municipalities and energy initiatives, the role and perception of the two parties and the aspects that influence this collaboration. Besides, the modes of governing and roles for intermediaries are studied for stimulating local energy cooperatives. The outcomes of this literature study form the input for empirical research. The input for the empirical research is summarized in Table 3.1.

Theoretical framework component	Input empirical research
<i>Renewable energy initiatives</i>	The focus of this research is on community-focused cooperatives.
<i>Collaboration in project development</i>	The stages in project development; conception, feasibility, planning, and operation.
<i>Modes of governing</i>	An enabling mode of governing can support local energy cooperatives.
<i>Intermediary roles</i>	A facilitating intermediary role can stimulate collaboration.
<i>Perspectives on transition</i>	Focussing on collaboration and knowledge sharing via niches can stimulate local energy cooperatives.

Table 3.1 Input for the empirical research based on the theoretical framework

Case study

In the Discover-phase of the Double Diamond, the aim is to further investigate the problem statement. By studying three cases in practice, the stated barriers are more studied in-depth. Participants of this case studies can declare their perspective on the potential problems within the collaboration (Tellis, 1997). In this research, a case study consists of an interview with a municipal officer responsible for the local energy cooperatives and a deputy from the board of the local energy cooperative. Besides, public documents related to the case and the website from the local energy cooperative are studied. For the selection of the cases, five criteria are taken into account. The following selection criteria are set:

- The case is a community focussed energy cooperative, cooperatives in which citizens are the initiator, to be able to study one type of energy initiative and its relation to the government;
- Within the case, the local energy cooperative and the municipality are currently collaborating, otherwise, the relationship between the two parties is more difficult to study;
- Every case is conducted in a different municipality, to be able to abstract differences and similarities between multiple municipalities;
- The case takes place in the same province, therefore, the provincial and national policies and structures are identical;
- The case is in or past the planning stage, to be able to focus on an established relationship between the municipality and the local energy initiative and draw comparisons between the different municipalities.



Figure 3.2 Case locations (own illustration)

Following these selection criteria, three cases within the province of North-Brabant are selected. The locations of these municipalities are indicated in Figure 3.2. The selected cases and their specifics are shown in Table 3.2.

	Case I BRES	Case II O40Energie	Case III BWW
Type of initiative	Community-focused	Community-focused	Community-focused
Main activity	Providing advice	Providing advice	Windmill development
Public-private collaboration	Yes	Yes	Yes
Municipality	Breda	Eindhoven	's-Hertogenbosch
Province	North-Brabant	North-Brabant	North-Brabant
Phase of the project	Operation stage	Operation stage	Planning stage

Table 3.2 Case specifics

For the interviews, both the municipality and the local energy cooperatives are consulted. In the case of the municipality, the accountable officer for sustainability, or the energy transition in specific, is interviewed. Every municipality is differently organised, however, in the selected cases these officers for sustainability are accommodated by the spatial or environmental department. For the local energy cooperative, a member of the board is interviewed. An overview of the interviewees is shown in Table 3.3.

Location	Organisation	Function
Breda	Municipality	Energy transition advisor
Breda	Local energy cooperative	Director of BRES
Eindhoven	Municipality	Project leader energy transition
Eindhoven	Local energy cooperative	Secretary of the board of O40Energie
's-Hertogenbosch	Municipality	Sustainability program manager and energy policy officer
's-Hertogenbosch	Local energy cooperative	Chairman of the board of BWW

Table 3.3 Overview of interviewees

The barriers of the problem statement combined with the literature study are the basis for the interview questions: (1) attitude of the municipality, (2) group dynamics and composition of the local energy cooperative, and (3) ignorance. The interviews are semi-structured, which aims for a conversation in which the interviewer asks open questions to the interviewee (Longhurst, 2016). The relation between the literature study and the interview protocol is shown in Table 3.4. The complete interview protocol can be found in Appendix A. Within the interviews, the focus is on the verification of the identified barriers and possible solutions. The input from the literature study, as shown in Table 3.1, is taken into account. The interview is divided into three parts;

1. Questions related to the development of the local energy cooperative
2. Questions related to the support of the local energy cooperative provided by the municipality
3. Questions related to the collaboration between the local energy cooperative and the municipality

Interview protocol	Theoretical framework component
<i>Development of the local energy cooperative</i>	<ul style="list-style-type: none"> • Phase of project development of the local energy cooperative
<i>Support of the local energy cooperative provided by the municipality</i>	<ul style="list-style-type: none"> • Knowledge sharing, network forming • Mode of governance by the municipality • Intermediary role by the municipality
<i>Collaboration between the local energy cooperative and the municipality</i>	<ul style="list-style-type: none"> • Establishment of the collaboration • Communication between the parties

Table 3.4 Theoretical input for the semi-structured interviews

Data treatment and analysis

Due to the COVID-19 pandemic, the interviews do not take place on the location of the case, but via telephone, Microsoft Teams, and Skype. After asking, all interviews are recorded. A transcript of the interview is sent within two weeks to the interviewee, therefore, the participant can make adjustments to their statements.

All transcripts of the interviews are analysed. Relevant information from the transcripts is highlighted and collected in an Excel document. This highlighted information is structured following three categories, which are shown in Table 3.5. The options for the 'aspect' category are based on the problem statement, the literature study, and the interview protocol. Structuring and linking of the cases are used

to apply a cross-case analysis. The purpose of this method is to abstract information from all the cases to propose similarities and differences (Cruzes et al., 2015).

Categories	Case	Role	Aspect
Options	Breda Eindhoven 's-Hertogenbosch Verification	Local energy cooperative Municipality	Policy Case development Collaboration Knowledge sharing Governance

Table 3.5 Transcript analysis

3.3 DEFINE-PHASE

The outcomes of the literature study and the empirical research provide clarity on the actual problem within the collaboration between the municipalities and the local energy cooperatives. The outcome of the Discover-phase is the identification of the problems occurring in the collaboration in the three cases.

Verification interviews

For the Define-phase, the insights from the literature and case studies are used for semi-structured interviews with national parties representing the local energy cooperatives (EnergieSamen) and the municipalities (Platform31). By executing these interviews the collaboration between local energy cooperatives and municipalities is considered from three perspectives; (1) municipalities, (2) local energy cooperatives, and (3) national parties representing the municipalities and local energy cooperatives. The three perspectives correspond to data source triangulation and strengthen the validation of the data (Carter, Bryant-Lukosius, Dicenso, Blythe, & Neville, 2014). The focus within these interviews is on the verification and potential generalisation of the problem. The protocol for these interviews can be found in Appendix A. The interviews are subdivided into three parts;

1. Questions related to the development of collaboration
2. Questions related to the perspective of municipalities
3. Questions related to the perspective of local energy cooperatives

Data analysis

The interviews with Platform31 and EnergieSamen were transcribed and sent within two weeks to the interviewees. Relevant information from the transcripts is collected in an Excel document. Structuring the relevant information is executed by the use of Table 3.5. Grounding the problem during these interviews, the actual problem for designing the prototype is abstracted.

The outcomes of the literature study, case studies in North-Brabant, and verification interviews are the basis for the well-defined problems and requirements for the development of a process design. By completing the first diamond of the method, the actual problem is stated and the development of the process design to overcome the barriers in collaboration can start.

3.4 DEVELOP-PHASE

The Develop-phase is about designing a prototype of a process design that includes all the findings from the Discover- and Definition-phase. By accomplishing the first diamond, the problem is defined. In the Develop-phase, the challenge is to diverge and study other areas or sectors that might provide interesting insights towards a solution for the defined problem. For this research, the focus for the diversion is the collaboration between citizens and municipalities and their methods of collaboration in other sustainability projects. For this study, the selected areas of research and their motivation are shown in Table 3.6.

Area of research	Reason for research
<i>Collectief Particulier Ondernemerschap (CPO)</i>	A citizen's collective initiates for collaboration with the municipality for establishing their objectives
<i>Wijkkompas</i>	Municipalities initiate collaboration with citizens to stimulate the heat transition
<i>Programma Aardgasvrije Wijken (PAW)</i>	Municipalities initiate for collaboration while having a directioning role in stimulating the heat transition
<i>Stappenplan Participatie Breda</i>	Municipality informs their citizens about participation with the municipality

Table 3.6 Areas of research

Data analysis

These other areas are the basis for the process design. Within these areas, frameworks are developed to facilitate the collaboration between municipalities and citizens. These frameworks are divided into the stages of project development of Haggett et al. (2013): conception stage, feasibility stage, planning stage, and operation stage. This division structures all the areas of research and eases the comparison between the different areas. Processes within the areas may show similarities and differences in how to facilitate collaboration between municipalities and citizens by a framework. The result of the Develop-phase is a range of possible directions for the solution in the form of a process design.

3.5 DELIVER-PHASE

In the Deliver-phase, the possible directions for the solutions are combined and diverged into a first prototype of the process design. This solution is validated by all the interviewees of the local energy cooperatives and municipalities. The design thinking process is iterative (Liedtka, 2013). Validation by people participating in the process between municipalities and local energy cooperatives supports to strengthen the process design as a form of iteration. Besides, the prototype of the process design includes the process of both parties. Validating by both parties invites the parties to comment on the full process instead of focussing on their process solely. All perspectives from the interviews and studies areas are taken into account. This may offer new insights for the interviewees during the validation. Besides that, the parties able to get acquainted with each other's process and understand each other's process.

The process design is validated by an online survey. The survey is divided into two parts;

1. Statements regarding the content of the process design
2. Evaluation of the process design in general

The statements and the evaluation of the process design are both linked to the specified project stages of the process design. The statements regarding the content of the process design are used for clarifying potential struggles within the process, which are identified during the rest of the research. The evaluation of the process to assess the completeness and correctness of the processes between both parties. The online survey is shown in Appendix D.

Data analysis

For the data analysis of the validation, the answers of the participants are reviewed and compared. The results are analysed following the structure of the design, per phase. All the results from the online survey are collected in Appendix E. After the validation, final adjustments are made to the process design, the recommendations are gathered, and final advice is written.

Results and Analysis

Discover

Define



The results of the first diamond of the Double Diamond are discussed in this chapter. The research was executed following the four stages of the Double Diamond method; Discover, Define, Develop, and Deliver. In this chapter, the discover and define stages are discussed as shown in light green in Figure 4.1. In the first diamond of the Double Diamond method, the following sub-question is answered: *What insights in the collaboration between municipalities and local energy cooperatives need to be applied in a design?* For answering this question, a literature study and an empirical study are used. At the end of this chapter, a defined problem for designing a framework is presented.

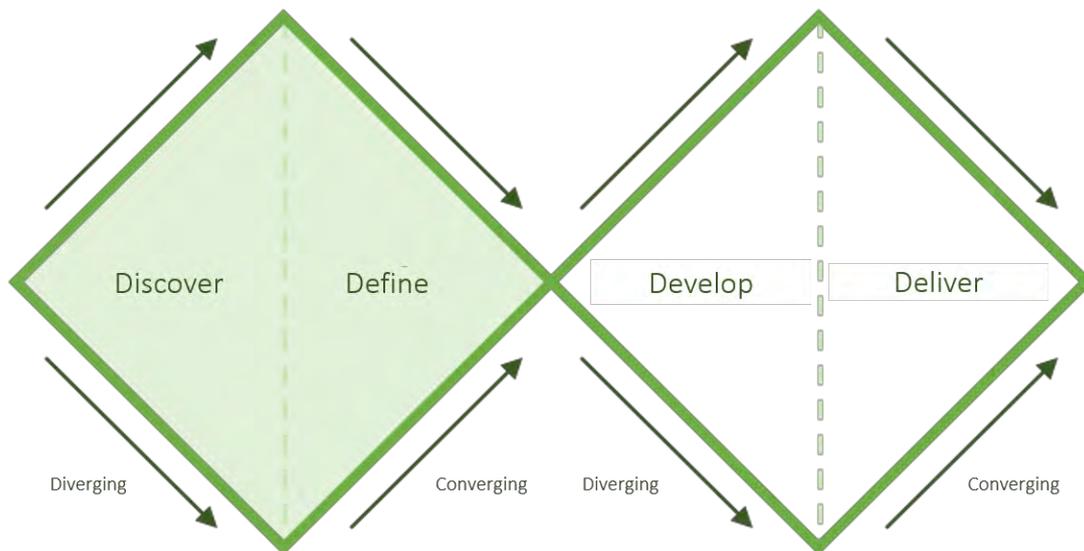


Figure 4.1 Double Diamond method in chapter 4 (adapted from Design Council, 2007)

4.1 DISCOVER-PHASE

In the Discover phase, the problem statement is analysed. The literature review resulted in several insights and forms the basis for the case selection criteria and the interview protocol. In the problem statement, three barriers for collaboration have been addressed: (1) the attitude of the municipality, (2) the group dynamics and group composition of the local energy cooperative, and (3) ignorance. In the interviews with the representatives of the cases, the focus is addressed to these barriers to comparing the literature with practice. Regarding the literature, several aspects of the collaboration between local energy cooperatives and municipalities are endorsed in the interviews. First of all, the mode of governing and the potential intermediary role in the process could be decisive in the realisation of the objectives of the project. Another aspect is that the attention to knowledge sharing, evaluation, and supporting resources could stimulate collaboration positively. For establishing a joint process, the guideline of the process and conditions for collaboration need to be clear.

Three cases in the province of North-Brabant are studied to define their methods, bottlenecks, and opportunities. These cases are indicated in Table 4.1; Breda (I), Eindhoven (II), and 's-Hertogenbosch (III). The municipalities of Breda, Eindhoven, and 's-Hertogenbosch belong to the five largest cities in the province, the B5 (Breda, Tilburg, 's-Hertogenbosch, Helmond, and Eindhoven). In 2019, Eindhoven had 231,642 inhabitants, Breda had 183,873 inhabitants, and 's-Hertogenbosch had 154,205 inhabitants (Centraal Bureau voor de Statistiek, 2020). The province of North-Brabant has developed a policy regarding the energy transition, in which local energy cooperatives are acknowledged and stimulated in their ambitions regarding the energy transition (Provincie Noord-Brabant, 2018). In the policy, it is stated that the province supports municipalities in providing knowledge about the technologies for raising more awareness regarding the topic. Besides that, the supporting local energy cooperatives are stimulated. The execution of the policy is for example possible by providing spatial permits to local

energy cooperatives and municipalities to stimulate the energy transition (Provincie Noord-Brabant, 2019). Besides the overarching policy of the province, every municipality has its policy and methods to achieve their objectives. These policies are in line with the provincial policy (Aartsen et al., 2018; Gemeente Eindhoven, 2016; van der Geld, 2019).

	Case I BRES	Case II 040Energie	Case III BWW
<i>Type of initiative</i>	Community-focused	Community-focused	Community-focused
<i>Main activity</i>	Providing advice	Providing advice	Windmill development
<i>Public-private collaboration</i>	Yes	Yes	Yes
<i>Municipality</i>	Breda	Eindhoven	's-Hertogenbosch
<i>Province</i>	North-Brabant	North-Brabant	North-Brabant
<i>Phase of the project</i>	Operation stage	Operation stage	Planning stage

Table 4.1 Cases and their specifics

For realizing an energy transition, the Netherlands has been divided into 30 energy regions: the RES regions. RES is the abbreviation for Regional Energy Strategy ('Regionale Energie Strategie'). The three selected cases are located in three different RES regions; RES West-Brabant, RES Metropoolregio Eindhoven, and RES Noordoost-Brabant (Centraal Bureau voor de Statistiek, 2019). Each region has to develop a strategy for the execution of the Climate Agreement objectives (VNG, 2018). Following the strategies of West-Brabant (Breda), Metropoolregio Eindhoven (Eindhoven), and Noordoost-Brabant ('s-Hertogenbosch), attention is drawn to the stimulation and collaboration with local energy cooperatives (Bos et al., 2018; Kuppens, 2020; RES Noordoost-Brabant, 2020).

The three cases are discussed according to a structure. First of all the municipality of the case is described and their policy regarding the energy transition. Followed by 'Local energy cooperative', in which the local energy cooperative and their activities are described. Thirdly, in 'Collaboration' the collaboration between the municipalities and the local energy cooperatives reviewed by discussing their relationship and communication. After that, in 'Knowledge', the sharing of knowledge at several levels is discussed. At last, in 'Governing and instruments', the mode of governing and the instruments applied by the municipality are explained.

4.1.1 Case I: BRES (Bredase Energie Coöperatie)

The first case is situated in Breda. For the interview with the municipality, questions were asked to the department of Mobility and Environment. The insights from this interview will be discussed in this paragraph. In Figure 4.2, the organizational chart of the municipality of Breda is shown, in dark green the interviewed department is highlighted (Gemeente Breda, 2020). The chart shows the division of the departments within the municipality and the associated subjects. In 2008, the municipality of Breda had developed its first sustainability goal: to be fully energy neutral in 2044. Since 2008, every four years, a new execution program for sustainability is presented by the municipality and is divided into different themes, such as climate adaptation and climate mitigation (PlanBreda, 2020). For the execution of this policy, the municipality is planning on developing neighbourhood plans (Aartsen et al., 2018).

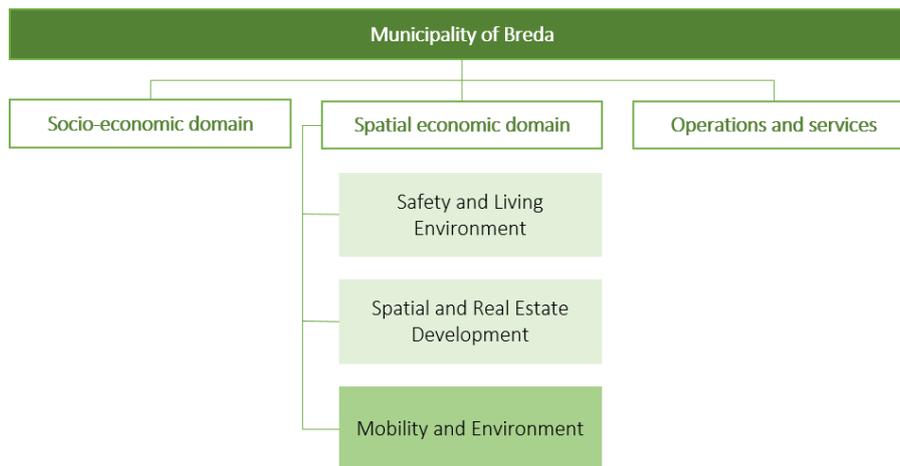


Figure 4.2 Organisational chart of the municipality of Breda (own illustration)

4.1.1.1 Local energy cooperative

The most considerable local energy cooperative of Breda is BRES (Bredase Energie Coöperatie). This cooperative is the first, and for now, the only local energy cooperative within Breda. The local energy cooperative was founded by citizens of Breda in 2014 and has 135 members, a board of six members, and 25 volunteers. BRES represents the interest of private homeowners who have the desire to make their houses more sustainable. Their activities consist most of all of informing the citizens of Breda and collaborating in projects within the energy transition. According to the research of 'Hier Opgewekt', BRES connects to a relatively large group of inhabitants compared to their amount of volunteers and is one of the most active cooperatives in the Netherlands (Schwencke, 2020). BRES distributes knowledge to private homeowners on how to make their homes more sustainable. Besides that, BRES cooperates in developing a heat transition vision with the municipality and participates in solar and wind power projects.

4.1.1.2 Collaboration

The collaboration between the municipality of Breda is reviewed by both parties as being constructive. BRES receives support from the municipality for the execution of their activities. Besides this support, BRES is invited by the municipality to cooperate in developing a vision of the heat transition of Breda. This indicates the aspect of the transition arena of the Transition Management perspective. Within this program, BRES represents the private homeowners. Both parties acknowledge that the collaboration was more difficult in the beginning than now. The main struggle was about where the emphasis within the execution should be, and how the activities should be communicated and organised. The municipality endorses that there are differences in the vision for sustainability among the actors. It took time for the involved actors to gain trust and to get acquainted with each other's roles, interest, expectations, and ways of working. In the last two years, by collaborating and communicating, these struggles between the two parties were overcome. Now, both parties recognize the high amount of energy that is invested by both parties to establish the objectives. BRES is, partly, run by a limited number of volunteers and they are responsible for a substantial number of activities. However, the municipality appreciates the work delivered by BRES and acknowledges that the costs might be higher for the municipality in case they hired a professional party for executing these activities.

Regarding communication, there have been struggles as well. Politics do not seem to be as consequent as the cooperative. The municipality acknowledges that they have to be more consequent in their communication towards citizens in local energy cooperatives about their objectives. This inconsistency seems, partly, caused by the elections that change the political direction every four years. Currently, the

communication between the parties is reviewed as being satisfactory. During the projects, there is weekly contact between the two parties. First, on both sides, multiple people were assigned to have contact which led to miscommunication. This was resolved by reducing the number of people that were in contact with each other and by coordinating more mutually. The following example of the level of communication was given by the municipality. At the beginning of the COVID-19 pandemic, large meetings became prohibited. The day after this disclosure, the municipality and BRES were already in contact and eventually webinars were held for the neighbourhoods to cover up for the cancelled activities and information evenings.

4.1.1.3 Knowledge

Knowledge is shared on various levels within this collaboration. Despite the valued collaboration, the municipality of Breda fears to create a monopolist which deters other initiatives and cooperatives, even though the municipality identifies BRES as a knowledgeable party. Due to the fear of the municipality of creating a monopolist, not all the knowledge available is being shared with BRES. BRES, in this case, has the most actual information about the energy transition and distributes this knowledge to the private homeowners by their website and voluntary energy coaches. In case a new local energy cooperative is being developed, they can gain information from BRES for the establishment of a new project. Besides that, together with the B5 (Breda, Tilburg, 's-Hertogenbosch, Helmond, and Eindhoven) knowledge is shared to assist municipalities and local energy cooperatives in their development. This indicates forms of network forming regarding the perspective of Strategic Niche Management. BRES is indirectly involved in the conception of other renewable energy projects as well, for their knowledge and experience. The municipality, because of their experiences with BRES, encourages this. In most of these cases, BRES is involved in the project from the conception until the operation stage. Besides the stimulation of BRES supporting other local energy cooperatives, there is no overarching procedure for the collaboration between the municipality and local energy cooperatives provided by the municipality.

Every year there is a moment of evaluation between the municipality and BRES. Besides the evaluation moments, there are progress meetings regularly. Through the years, the support of the municipality seems to support the cooperative of BRES. The number of personal advice meetings requested by local citizens exponentially increased. Once in a while, there is an evaluation organised by the municipality with all the local energy cooperatives.

4.1.1.4 Governing and instruments

The support of the municipality incorporates multiple components. As discussed in the literature study in Chapter 2, there are four modes of governing in local energy transition policy (Bulkeley & Kern, 2006). In terms of modes of governing, the municipality of Breda has an enabling mode of governing in the local energy transition policy as highlighted in Figure 4.3. By analysing the interviews within the case of Breda, several aspects are present in the collaboration between the municipality and BRES, these aspects have a checkmark in the Figure. Besides the governing through enabling, the municipality of Breda supports BRES by 'strategic planning to enhance energy conservation' by the introduction of the Green Hopper. This mobile information centre is used strategically to inform private homeowners about energy savings measures.

Self-governing	Governing by authority	Governing by provision	Governing through enabling
<ul style="list-style-type: none"> × Energy efficiency schemes within municipal buildings × Purchasing green energy × Procurement of energy-efficient appliances × Eco-house demonstration projects 	<ul style="list-style-type: none"> ✓ Strategic planning to enhance energy conservation × Supplementary planning guidance on energy efficiency design 	<ul style="list-style-type: none"> × Energy efficiency measures in council housing 	<ul style="list-style-type: none"> ✓ Campaigns for energy efficiency ✓ Provision of advice on energy efficiency to businesses and citizens ✓ Provision of grants for energy efficiency measures ✓ Promote the use of renewable energy

Figure 4.3 Mode of governing of the municipality of Breda (own illustration)

For the first aspect of governing through enabling, ‘campaigns for energy efficiency’, the municipality of Breda is having a sustainability contest for the city in which a one-year subsidy is being granted. Every year, the subsidy is granted to the project that suits the contest criteria the most. The proposed projects have to coincide with the objectives of the municipality for a collaboration. This contest is a campaign for stimulating renewable energy cooperatives and projects. The contest criteria are published in advance, one of the criteria is the amount of CO₂ reduction. The selection is similar to a multi-criteria analysis. First, BRES was one of the partners for developing the contest criteria. One day, BRES indicated they wanted to hand in a project themselves. Therefore, the municipality stopped their involvement in the contest criteria for the fairness of the contest. Currently, the criteria and the projects are being developed by an external party. BRES hands in a project every year and has been rewarded for this by earning subsidy. By receiving the subsidy, BRES agrees upon having progress meetings and delivering an end report. After the end report, the municipality determines the final amount of subsidy. The aim of the municipality by granting this subsidy is to stimulate BRES to help private homeowners to make their homes more sustainable.

For the second aspect of ‘provision of advice on energy efficiency to businesses and citizens’, the municipality supports BRES in providing advice to the citizens of Breda. To make this possible, BRES organizes information evenings in the neighbourhoods, provides personal advice by appointment, and maintains a website with information about the energy transition with the use of the subsidy from the municipality.

Lastly, the municipality, together with BRES, promotes the use of renewable energy. To improve the knowledge distribution to the private homeowners, the municipality of Breda introduced the ‘Green Hopper’. This mobile information centre is subsidized by European funding and offers opportunities for BRES to affect more people. Together with the municipality, they are responsible for the Green Hopper. The Green Hopper is strategically located in a neighbourhood for three weeks and is the first step in informing citizens. At the end of the three weeks, the municipality and BRES host an information evening. The permit for the location of the Green Hopper is granted by the municipality, BRES organises the information evening. A letter from the municipality to the inhabitants is distributing information about the Green Hopper and the information evening. Experience has shown that a letter send by the municipality results in a higher attendance than a letter from BRES.

The municipality grants a subsidy to BRES, shares knowledge about the energy transition, and provides advice for organising together with BRES the Green Hopper and the information evening. The municipality does not facilitate by capacity building, this is executed by BRES itself. Following the theory of Warbroek (2019) it can be stated that the intermediary role of the municipality, in the case of BRES, is facilitating, as highlighted in Figure 4.4. Besides the facilitating role, the municipality engages with EU policymakers to obtain a subsidy for the Green Hopper. In addition, by organising a yearly sustainability contest the municipality articulates their demand to BRES and other citizens that are willing to establish a sustainable project.

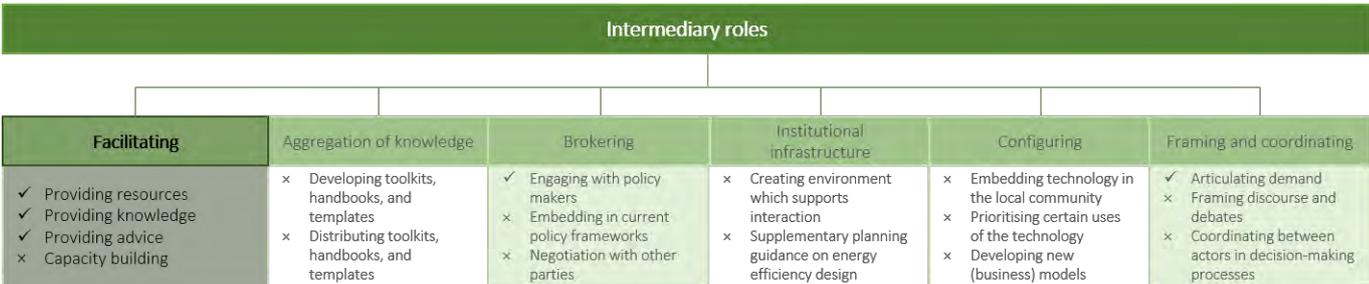


Figure 4.4 Intermediary role of the municipality of Breda (own illustration)

4.1.1.5 Conclusion

Concluding, in the case of Breda, the municipality and the local energy cooperative are positive about their collaboration. Regarding the energy transition, BRES has evolved into a professional and experienced party for the municipality. The municipality governs through enabling and has a facilitating role within the collaboration.

4.1.2 Case II: 040Energie

The second case takes place in the largest municipality of North-Brabant, Eindhoven. The department of Spatial Expertise was interviewed for this research. The organizational chart of the municipality of Eindhoven is shown in Figure 4.5, the interviewed department is highlighted in dark green (Gemeente Eindhoven, 2020). The chart shows the division of the departments within the municipality and the associated subjects. The policy of the municipality of Eindhoven, regarding the energy transition, is based on Trias Energetica. This means, their focus is on reducing the need for energy and replacing the energy being used for renewable energy.



Figure 4.5 Organisational chart of the municipality of Eindhoven (own illustration)

4.1.2.1 Local energy cooperative

040Energie was founded in 2013, is the largest local energy cooperative in Eindhoven, and actively informs private homeowners about how they can make their houses more sustainable. The reason for establishing 040Energie was a complex procedure for private homeowners to buy solar panels for personal usage. The aim is to inform more citizens about these procedures, the struggles, and the opportunities. The cooperative has 1,500 members and has a board of six members. Their activities consist largely of informing the citizens of Eindhoven. By organising information meetings, they provide general information and energy coaches can give personal advice for interested private homeowners on how to make their houses more sustainable. Besides the advice, 040Energie negotiates every year with suppliers of renewable energy products for the implementation. By doing this, private homeowners can implement the advice for a reduced price.

4.1.2.2 Collaboration

The collaboration with 040Energie is positively reviewed by the municipality of Eindhoven and is supposed to be close. For the municipality, the cooperative of 040Energie is a tool for realising their goals. They endorse that close collaboration and communication results in a better outcome and that both parties cannot realise their objectives without each other. Overall, the cooperative is positive as well about the collaboration. However, in some aspects, the cooperative is less positive.

The largest struggle concerns the vision about the heat transition. By the end of the year 2020, the plans of the municipality of Eindhoven for a heat network will be finished. Within these plans, a couple of neighbourhoods will be adjusted to offer possibilities for connection to the heat network. Therefore, the municipality does not want to promote for heat pumps in these areas. Heat pumps are an expensive investment and the planned heat network will have similar outcomes compared to the heat pumps for the citizens. The municipality does not want citizens to invest in a product they might not need and a product that is conflicting with the heat transition vision of the municipality. The cooperative of 040Energie still informs citizens of these selected neighbourhoods about the possibilities for heat pumps, because they believe this product is economically more beneficial on the long term and citizens should be able to make a thorough consideration about the various options. This discussion is part of another disagreement. The cooperative wants to expand the collaboration with the municipality by developing a shared vision, but these attempts are declined by the municipality. In some cases, the municipality asks for the opinion or knowledge of the local energy cooperative, but this seems to happen on a non-regular basis. Following the perspective of Transition Management, the use of transition arenas could clarify this disagreement about the vision regarding the energy transition.

In terms of communication, both parties assigned one contact for the communication. These contacts have regular meetings about the progress of the projects. The contact of the municipality is in monthly contact with the rest of the department of the municipality to align all the projects that are taking place regarding the energy transition. Besides the general communication, 040Energie has contact with specific departments within the municipality for their substantive and process-related questions when it is needed. The municipality believes that the key to success is in communication. Despite, the benevolence of both parties, there are some struggles within the communication. The involved departments within the municipality and their associated interests are ambiguous for the local energy cooperative. While their general contact of the municipality agrees upon its objectives, another department might refuse their plans. The cooperative describes the municipality as benevolent but not always capable and it seems to appear as if the municipality does not have enough time to develop an overarching vision.

In short, both parties are collaborating, however, there seem to be some disagreements about the details of the collaboration. 040Energie is convinced that there might be more potential for collaboration, but this potential may currently not efficiently used. The local energy cooperative believes their knowledge and opinion in realising the energy transition are not heard by the municipality.

4.1.2.3 Knowledge

The municipality acknowledges the importance of knowledge sharing with 040Energie. The cooperative should be able to digitally share their knowledge and experiences with the rest of the city. There is information shared about the objectives of the cooperative and the objectives of the municipality. However, the cooperative states that there is limited knowledge sharing between the two parties. 040Energie assumes that the municipality is more focused on realising their renewable energy instead of collaborating with citizens in this transition.

There is no overarching procedure developed by the municipality for establishing the process of collaboration between the municipality and a (new) local energy cooperative. The municipality states that the citizens know how to connect to the municipality in case they are coping with problems or questions during their process of establishing their cooperative objectives. Every cooperative can collaborate with the municipality during their process, while their objectives are in line with the objectives of the municipality. Knowledge is shared within the municipality to avoid the risk of contradicting cooperative objectives. The municipality avoids this risk because it will lead to extra work for a cooperative, which is run by volunteers.

Within the cooperative, knowledge about the energy transition is being gained via workgroups. Several subjects within the energy transition are being studied within these working groups consisting of members of the cooperative. By studying these subjects, the cooperative aims to have up to date information and to develop new projects.

More knowledge is gained by connecting to other local energy cooperatives. Besides knowledge, collaborations are being established. During these collaborations, some solar parks have been established. These collaborations offer opportunities for local energy cooperatives, while they may use each other's knowledge instead of reinventing the wheel. This indicates forms of network forming as stated by the perspective of Strategic Niche Management.

4.1.2.4 Governing and instruments

The municipality of Eindhoven is experimenting with several methods for establishing the energy transition in their city. They are convinced about the method of working with 040Energie. Overall, the municipality is willing to facilitate bottom-up cooperatives rather than imposing top-down cooperatives. Therefore, they understand that reforms in the way of thinking of the municipality have to take place, for example, in terms of communication and participation. At the start of 040Energie, the municipality and the cooperative together were willing to stimulate the energy transition. Therefore, the municipality was supportive during the concept phase of 040Energie. Through time, 040Energie became more independent and needed less support from the municipality. As stated by the municipality, the local energy cooperative naturally became an independent collaboration partner within the city for stimulating the energy transition.

The municipality states to have a facilitating role within the collaboration with the local energy cooperatives. Besides the assumed facilitating role, the framework for the energy transition is set by the municipality. Following the modes of governing of Bulkeley & Kern (2006), the municipality of Eindhoven seems to govern through enabling as highlighted in Figure 4.6.

Self-governing	Governing by authority	Governing by provision	Governing through enabling
<ul style="list-style-type: none"> × Energy efficiency schemes within municipal buildings × Purchasing green energy × Procurement of energy-efficient appliances × Eco-house demonstration projects 	<ul style="list-style-type: none"> × Strategic planning to enhance energy conservation × Supplementary planning guidance on energy efficiency design 	<ul style="list-style-type: none"> × Energy efficiency measures in council housing 	<ul style="list-style-type: none"> × Campaigns for energy efficiency ✓ Provision of advice on energy efficiency to businesses and citizens ✓ Provision of grants for energy efficiency measures ✓ Promote the use of renewable energy

Figure 4.6 Modes of governing of the municipality of Eindhoven (own illustration)

First of all, regarding governing through enabling, advice about the energy transition is provided by information evenings. These evenings are organised and presented by 040Energie and the municipality presents their vision on the energy transition as well. The cooperative acknowledges the support of the municipality during these evenings. However, some evenings, the officials of the municipality are not available. In that case, the vision of the municipality is presented by the cooperative.

Second of all, for the 'provision of grants', the subsidy for flyers to inform the citizens about the information evenings is being granted. Besides that, at the end of 2019, the RRE ('Regeling Reductie Energiegebruik') was launched by the national government. The purpose of this subsidy was the implementation of applications for renewable energy. This subsidy had to be requested by the local government. The municipality of Eindhoven applied for the subsidy and the subsidy was made available for 040Energie. The cooperative used the subsidy for the development of an online energy scan for the citizens of Eindhoven.

Last of all, for the promotion of O40Energie and the use of renewable energy, letters are sent by the municipality. It has been proven in the past, that the response rate to a letter sent by the municipality is three times higher than the letters sent by O40Energie. Sending a municipal letter is not customary, but the municipality considers the energy transition important, therefore they are willing to send these letters to create support among citizens.

The intermediary role of the municipality of Eindhoven, in this case, is facilitating according to the theory of Warbroek (2019) as highlighted in Figure 4.7. However, their facilitating role is limited. Financial resources are being provided and both parties together facilitate the information evenings. The knowledge that is being shared is limited and no capacity is built by the municipality. In addition, the municipality has a limited brokering role as well. They obtained RRE subsidy from the national government to stimulate private homeowners to implement sustainable measures to their homes.

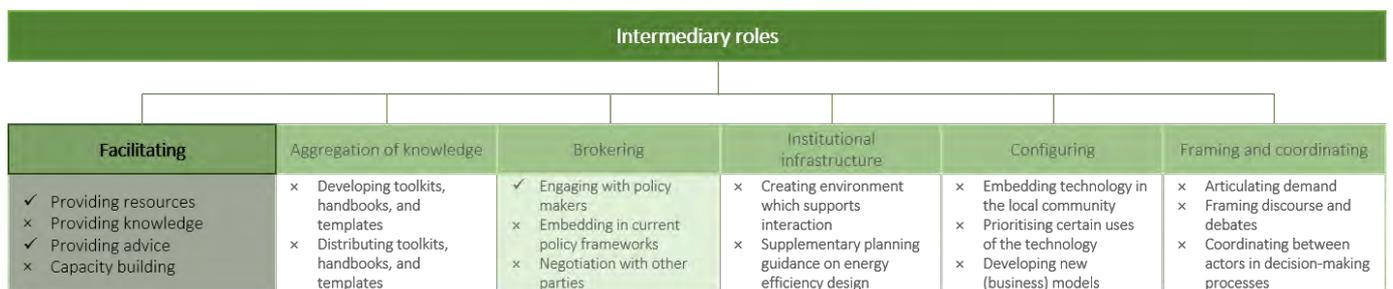


Figure 4.7 Intermediary role of the municipality of Eindhoven (own illustration)

4.1.2.5 Conclusion

In short, there are some struggles within the collaboration and communication in the case of Eindhoven. The cooperative of O40Energie appeals for more support and collaboration, especially in developing a vision about the energy transition. Besides the struggles, the municipality seems to have an enabling mode of governing and a facilitating intermediary role in this collaboration.

4.1.3 Case III: BWW (Bossche Windmolen West)

The third, and final, case is located in 's-Hertogenbosch. For the interview, in this case, questions were asked to the department of Climate. The municipality is organized as shown in Figure 4.8, the interviewed department is highlighted in dark green (Gemeente 's-Hertogenbosch, n.d.). The chart shows the division of the departments within the municipality and the associated subjects. There are multiple local energy cooperatives active within the municipality of 's-Hertogenbosch. Some are initiated by the municipality, others are initiated by the citizens themselves. Collaborating with these cooperatives is part of the ambition of the municipality of 's-Hertogenbosch. For the collaboration, they are stimulating network formation between the multiple local energy cooperatives, this aligns with the perspective of Strategic Niche Management. The cooperatives have various ways of collaboration with the municipality, as well as different support that they may receive.

4.1.3.1 Local energy cooperative

Within the municipality of 's-Hertogenbosch, a local energy cooperative, EC073, was being initiated as a platform for private homeowners to make their houses more sustainable. In 2013, this platform resulted in two other initiatives: one focussing on solar power and the other focusing on wind power. The interviewed cooperative is the Bossche Windmolen West (BWW), the local energy cooperative which is developing one of the four windmills that are currently being realised in the city of 's-Hertogenbosch. The project is located in De Rietvelden, an industrial area on the periphery of the city. The windmill of BWW is going to be a cooperative windmill from which local citizens can buy wind

energy. The permits for the construction have been granted by the municipality and the construction of the windmill will start at the beginning of 2021.

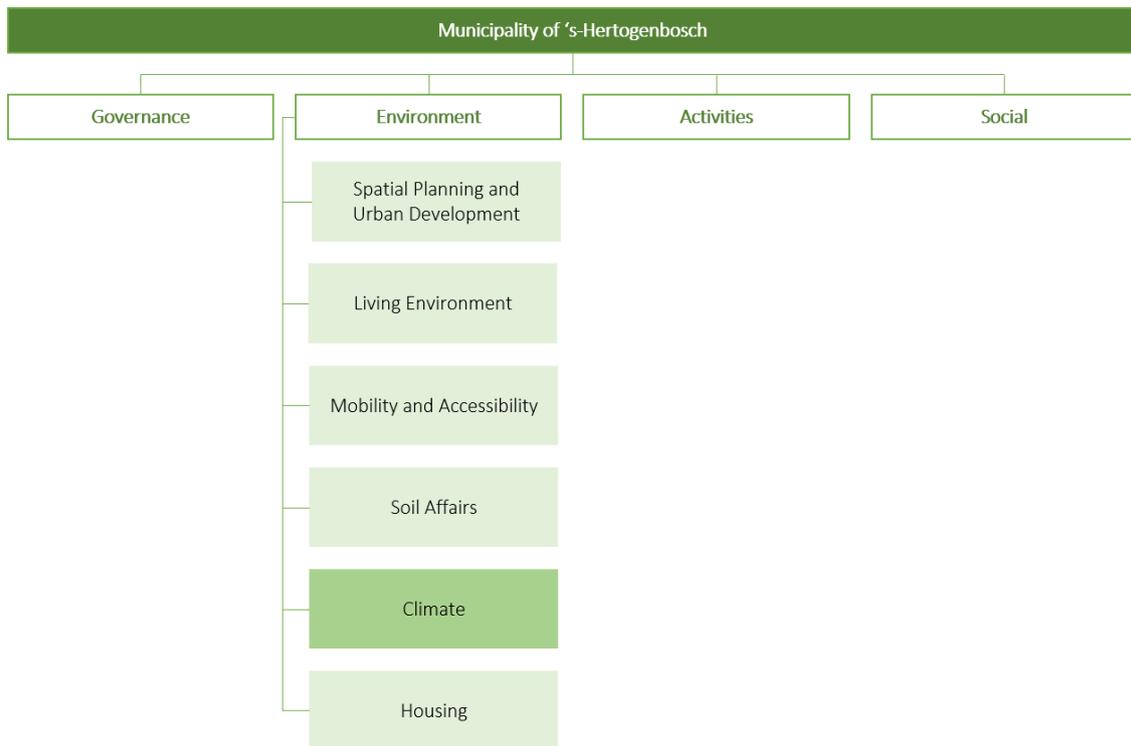


Figure 4.8 Organisational chart of the municipality of 's-Hertogenbosch (own illustration)

4.1.3.2 Collaboration

The initiative for the windmills In De Rietvelden came from the municipality. The first preliminary zoning plan was published in 2014. BWW was already involved and willing to realise one cooperative windmill, De Rietvelden was assumed to be an appropriate location. By including BWW, the municipality endorsed the level of citizen participation in this renewable energy project. For the approval of the plans, the plan has to be available for inspection to all possible stakeholders. In the case of windmills, it is acknowledged that after this inspection, a legal procedure will follow. This legal procedure delayed considerably. During the procedure of the windmills in 's-Hertogenbosch, the municipality kept herself aloof. As stated by BWW, this encourages the fury of the opponents of the project. The BWW did not understand the chosen attitude of the municipality, by being transparent about their visions this legal procedure could have been avoided.

The collaboration between the municipality of 's-Hertogenbosch and BWW is positively reviewed by both parties. Although the cooperative of BWW operates mostly independently, both parties collaborated to realise the development of the windmill. From the perspective of BWW, the collaboration with the municipality is described as finding a balance between two elements. On the hand, the cooperative has to organise its initiative and the potential resources. On the other hand, the activities of the municipality and their policies have to be taken in to account by the local energy cooperative in developing their plans. The municipality of 's-Hertogenbosch admires the independence of BWW. This independence is partly due to the group composition of BWW, and their associated knowledge. The involved citizens have expertise in legal, sustainability, public administration, construction, and finance.

The collaboration and communication between the two parties were mostly focused on the conception and feasibility stage of project development. Within these stages, the municipality assisted in facilitating

support within the city of 's-Hertogenbosch and was involved in the decision-making about the permits for the construction of the windmill. The municipality explains the number of hours, that is needed to stimulate the energy transition properly, is more than the hours that are currently available. They are not able to support all initiatives within the city, however, they believe that their support is crucial in realizing an energy transition. Therefore, they appreciate the persistent initiatives for their drive to realize their energy initiative. However, the municipality acknowledges the fact that the local energy cooperatives are run by citizens voluntarily and, therefore, their time is precious and limited.

Besides all the positive aspects of the collaboration. There is an example of a struggle in collaboration as well. BWW has to deal with several departments within the municipality and they receive support from these departments as well. Overall, they know who to contact at which stage of the process. These departments do not always share the same vision about the project of the cooperative windmill. Both the municipality and local energy cooperative acknowledge the discussions of the sustainability department versus the ecological department and other departments. For example, the land affairs department is highly strict on the cast shadow. The cast shadow is caused by the blades of the windmill and touches upon industrial land owned by the municipality, for which the BWW has to pay compensation. However, after discussions, it is assumed that the land affairs departments still aims for the maximum of compensation for their industrial land. This reveals that within the municipality one department may advocate for citizen participation within the renewable energy transition, while on the other hand department may create a more complex and expensive process for these citizens. The municipality endorses their different roles within these processes. Besides facilitating the energy transition, they have to be a neutral and consistent partner for all citizens as well. This means, the land affairs department is not able to make an exception to BWW, otherwise other parties will ask for the same approach and the municipality attempts to be independent of all parties.

BWW is critical on the attitude of the municipality regarding the communication about the windmills towards the rest of the city. During the legal proceedings, the municipality did not communicate. In terms of communication, within the municipality, there is nobody assigned to be the contact of BWW. However, BWW assumes that they are in contact with the appropriate officials within the municipality. Through experience, they know who to contact for which part of the project. Besides that, there is contact regularly with the councillor who is responsible for the department of Climate within the municipality. During the project, there was no evaluation being executed.

4.1.3.3 Knowledge

The knowledge about the collaboration between BWW and the municipality of 's-Hertogenbosch is shared in several ways. First of all, BWW endorses the amount of knowledge that is available within the municipality. This statement was acknowledged by the municipality because they have substantially learned from their experiences within the energy transition, an indication for the perspective of Strategic Niche Management. However, the municipality as well states that local energy cooperatives are ahead in terms of their questions. The municipality is still working on developing a vision about, for example, the heat and energy transition. Questions about the execution of the heat and energy transition cannot always be handled by them, because of a lack of vision or strategy.

No standard procedure is developed for knowledge sharing about the collaboration between the municipality and a local energy cooperative. Currently, the municipality of 's-Hertogenbosch works on five neighbourhoods to become natural gas-free. Within this project, a standard procedure may help both parties. However, the municipality acknowledges the difficulty of establishing a standard procedure because of the differences between the projects regarding becoming natural gas-free. In every project other citizens are involved, every neighbourhood has its signature, the houses in every neighbourhood are different, and the amount of support needed differs. The same applies to develop a procedure for the activities of a local energy cooperative.

Knowledge is being shared by BWW with other local energy cooperatives as well. All information about the project of BWW is online available to others, except for the formal agreements with landowners and other stakeholders. Still, in a relationship of trust, BWW is willing to share this information with another local energy cooperative. Together with other local energy cooperatives in the region, BWW is investigating possibilities to join their forces. The aim is to develop a formal construction to use experiences from local energy cooperatives within the region to advise and develop new renewable energy projects. Within this formal construction, there should be compensation for the work executed by the citizens. As stated by BWW, not all the work regarding the energy transition can be done by volunteers within their free time.

4.1.3.4 Governing and instruments

There is a network, within the city of 's-Hertogenbosch, of actors involved in the energy transition. The municipality and local energy cooperatives are active in this network as well. Currently, the network is focused on relations between different actors. However, the municipality is willing to connect these actors more actively to organise a more active network in which all partners and the local energy cooperatives can join. The municipality stimulates citizens to develop their plan for realising an energy transition, however, the municipality wants to be involved in those plans.

As highlighted in Figure 4.9, the mode of governing of the municipality of 's-Hertogenbosch can be described as enabling following the theory of Bulkeley & Kern (2006). Besides the enabling modes of governing, the municipality of 's-Hertogenbosch partly governs by authority as well. The municipality assigned land for the development for the windmills, this coincides with strategic planning to enhance energy conservation.

Self-governing	Governing by authority	Governing by provision	Governing through enabling
<ul style="list-style-type: none"> × Energy efficiency schemes within municipal buildings × Purchasing green energy × Procurement of energy-efficient appliances × Eco-house demonstration projects 	<ul style="list-style-type: none"> ✓ Strategic planning to enhance energy conservation × Supplementary planning guidance on energy efficiency design 	<ul style="list-style-type: none"> × Energy efficiency measures in council housing 	<ul style="list-style-type: none"> × Campaigns for energy efficiency ✓ Provision of advice on energy efficiency to businesses and citizens ✓ Provision of grants for energy efficiency measures ✓ Promote the use of renewable energy

Figure 4.9 Modes of governing of the municipality of 's-Hertogenbosch (own illustration)

Corresponding to the enabling mode of governance, the provision of advice was in this case towards the BWW. The support towards BWW consists out of procedurally and politically enabling the project to happen. The municipality had drawn up the preconditions for the development of the windmill, they had issued an environmental permit, and facilitated all spatial procedures. Besides that, the municipality indicates that in case of local energy cooperatives, the municipality has to take a steering role. Due to this steering role, the municipality can align the local energy cooperatives with objectives of the municipality and this may lead to fewer struggles within the different departments within the municipality.

The amount of knowledge of the municipality is noticed by BWW and used in the development of the project. This knowledge is partly originated from the previous projects the municipality has been executing and therefore the municipality can provide suitable support. One of the aspects that supported BWW was the provision of a loan by the municipality. The municipality has given a guarantee on a loan for the expansion of the local energy cooperative. The money was used for campaigns for recruiting new members for the windmill and the development of a website. Another guarantee was being rejected by the municipality for political reasons. Therefore, BWW had to change its business plan for the sales of the windmill parts. In the eyes of the BWW, it was a riskless guarantee while it was

substantiated with a subscription plan. By publicly advocating for citizens participation, the municipality promotes the use of renewable energy.

The municipality of 's-Hertogenbosch acts as a facilitator, according to the theory of Warbroek (2019), for the project development of BWW as shown in Figure 4.10. Knowledge and financial resources are being provided to BWW by the municipality. The financial resources were used for building the capacity of the local energy cooperative to attract marketing and administrative staff. Advice for the location of the windmill is provided by the municipality, this corresponds to the brokering intermediary role and articulating their demand towards BWW and the rest of the city.

Intermediary roles					
Facilitating	Aggregation of knowledge	Brokering	Institutional infrastructure	Configuring	Framing and coordinating
<ul style="list-style-type: none"> ✓ Providing resources ✓ Providing knowledge ✓ Providing advice ✓ Capacity building 	<ul style="list-style-type: none"> x Developing toolkits, handbooks, and templates x Distributing toolkits, handbooks, and templates 	<ul style="list-style-type: none"> ✓ Engaging with policy makers x Embedding in current policy frameworks x Negotiation with other parties 	<ul style="list-style-type: none"> x Creating environment which supports interaction x Supplementary planning guidance on energy efficiency design 	<ul style="list-style-type: none"> x Embedding technology in the local community x Prioritising certain uses of the technology x Developing new (business) models 	<ul style="list-style-type: none"> ✓ Articulating demand x Framing discourse and debates x Coordinating between actors in decision-making processes

Figure 4.10 Intermediary role of the municipality of 's-Hertogenbosch (own illustration)

4.1.3.5 Conclusion

Concluding, in the case of the municipality of 's-Hertogenbosch and BWW, a solid collaboration has been established. BWW operates independently, still, they are in contact with the municipality about their plans and possible support. An explanation of the level of independence can be found in the group composition of BWW. The struggle within the collaboration is characterised by the multiple departments within the municipality and their associated differing visions. The municipality has an enabling mode of governing towards BWW and a predominant facilitating intermediary role.

4.1.4 General insights from cases

For the cross-case analysis, the three cases will be compared to each other. Differences and similarities will be highlighted to create a more general overview. The structure of this sector is similar to the structure of the cases. First of all the collaboration and communication within the cases will be discussed. This is followed by a comparison in terms of knowledge sharing. At last, the modes of governing and the instruments used by the governments are discussed.

4.1.4.1 Collaboration

The three cases indicate that multiple forms of collaboration are possible. The municipalities acknowledge a different approach for collaboration is needed to establish a local energy cooperative project and they are struggling with this new approach. The discussed aspects that are important in the three cases are summarized in Table 4.2. First of all, it should be mentioned that the municipality has more than one role and associated interest in supporting the local energy cooperatives. In every municipality, there are multiple departments with differing, and sometimes, conflicting visions and objectives. Therefore, approval from one department does not automatically imply approval by all of the departments. Secondly, all the municipalities endorse their role of being an independent authority. A local energy cooperative most of the times serves one of the neighbourhoods of the city instead of the whole city. The municipalities do not want to disadvantage other neighbourhoods. Besides that, the procedures for all partners and local energy cooperatives have to be similar and transparent. In case a local energy cooperative receives something deviating from the regular procedure, other parties may claim for the same.

The three municipalities are aware of the considerable assignment of the energy transition. The municipalities might not have the capacity to realise this assignment by themselves, collaboration with other parties is needed. This need for collaboration is addressed in all of their sustainability policies. However, their capacity, in the form of people and tools for supporting local energy cooperatives, is lacking.

The citizens involved in local energy cooperatives are most of the time volunteers. Processes within the energy transition are new to them and the project, most of the time, cost a lot of their spare time. For the municipality, it may be efficient to hire a project leader to support the local energy cooperative, as in case of 's-Hertogenbosch. However, this may lead to conflict, because the local energy cooperative itself does not get paid. For specific expertise, in case of Breda and 's-Hertogenbosch, the local energy cooperatives are willing to hire professionals themselves. In the case of BRES, the local energy cooperative of Breda, they have initiated a private company to be able to hire professionals for the development of the cooperative.

At the beginning of the collaboration, both parties need to get acquainted with each other's role, expectations, and interests. Citizens joining projects within the energy transition can be idealists about sustainability. Therefore, some citizens want the municipality to revise all their activities regarding the environment. This idealism may complicate the collaboration between the two parties and lead to conflicts. All the cases mention the importance of communication to get familiarized with each other to better understand each other.

The cases show that there are multiple options for communication between the two parties. In all three municipalities, there is at least one officer responsible for the energy transition and the local energy cooperatives. This officer has the most contact with the cooperatives and has an overview of the progress of the projects. To avoid miscommunication, all the parties in Breda and Eindhoven have assigned one person per municipality or local energy cooperative to communicate. However, in the case of 's-Hertogenbosch, the local energy cooperative knows who to contact for which part in the process and the local energy cooperative is the initiator of the contact.

Aspects regarding collaboration	Case I BRES	Case II O40Energie	Case III BWW
<i>Conflicting visions between departments within the municipality</i>	Yes	Yes	Yes
<i>Municipality endorses their independence</i>	Yes	Yes	Yes
<i>Lack of capacity at the municipality</i>	Yes	No	Yes
<i>Hiring professionals by local energy cooperatives to strengthen their capacity</i>	Yes	No	Yes
<i>Assigned contact person at the municipality</i>	Yes	Yes	No

Table 4.2 General insights regarding collaboration

4.1.4.2 Knowledge

Knowledge is being shared on different levels within the cases. The first level is the knowledge shared by the local energy cooperative with the municipality. Information about the implementations of the energy transition is most of all owned by the local energy cooperative. The involvement of the municipality in these types of projects, offer opportunities to learn for the municipalities, as seen in the case of 's-Hertogenbosch. For learning, progress meetings and evaluations between the local energy cooperative and the municipality are being executed. However, all three municipalities do not have an overarching procedure for collaborating with local energy cooperatives. The municipalities argue that

every project in the energy transition is differently organised and has other objectives. Therefore, the knowledge about the process may be hard to summarize in a process.

Secondly, for knowledge sharing within the city, regions and municipalities are ordered to establish an Energy Counter ('Energie Locket'). This online tool offers information for private homeowners to make their houses more sustainable (Sociaal-Economisch Raad, 2013). Via the Energy Counter, citizens might be stimulated to organise their local energy cooperative. Also, citizens will be informed about the possibilities for joining a local cooperative, or are informed about the implementation of renewable energy interventions.

Thirdly, knowledge is shared between local energy cooperatives to inform each other and to use each other's strengths to develop new projects. In the case of Eindhoven, O40Energie cooperated with a solar power cooperative to realise a solar power roof for the neighbourhood. BRES, in Breda, informs starting local energy cooperatives about their experiences. BWW, in 's-Hertogenbosch, is developing a platform for starting local energy cooperative to share their experiences.

Lastly, knowledge is needed for establishing a local energy cooperative. It may be advantageous to involve citizens in the local energy cooperative who are experts in the juridical and financial domain. The case of 's-Hertogenbosch indicates that the competences of the group composition may be decisive in the success of a local energy cooperative. Besides the knowledge skills, the parties in Breda endorse the need for persistence, especially for the local energy cooperative within the collaboration with municipalities.

Aspects regarding knowledge	Case I BRES	Case II O40Energie	Case III BWW
<i>Knowledge sharing between the municipality and local energy cooperative</i>	Yes	No	Yes
<i>Overarching procedure for collaboration</i>	No	No	No
<i>Knowledge sharing between local energy cooperatives</i>	Yes	Yes	Yes
<i>Internal experts in the juridical and financial domain</i>	No	No	Yes

Table 4.3 General insights regarding knowledge

4.1.4.3 Governing and instruments

Reflecting on the modes of governing, all the municipalities seem to govern through enabling. Although they seem to have the same mode of governing, within this mode of governing there are differences as shown in Table 4.4. Only in the case of Breda, the municipality is actively executing campaigns for energy efficiency. Every year, they organise a sustainability contest to stimulate citizen participation in the energy transition. Besides that, together with BRES, they arrange campaigns for informing private homeowners about the possibilities for renewable energy interventions.

In the studied cases, grants for supporting the local energy cooperatives are provided in different ways. For example, the municipality of Breda organises a sustainability contest every year. By winning this contest, the local energy cooperative obtains a grant for the execution of their project. The local energy cooperatives in Eindhoven and 's-Hertogenbosch receive a grant as well for the execution of their projects, while their municipality does not organise a contest. The municipalities in these cities assess the potential grants for the local energy cooperative per project.

All three municipalities are promoting renewable energy in their own way. The municipalities of Breda and Eindhoven are promoting via the local energy cooperatives that are active within their city. The municipality of 's-Hertogenbosch, promotes the use of renewable energy by posting articles about the projects of the local energy cooperative in the local newspaper.

Governing through enabling	Case I BRES	Case II O40Energie	Case III BWW
<i>Campaigns for energy efficiency</i>	Yes	No	No
<i>Provision of advice on energy efficiency to businesses and citizens</i>	Yes	Yes	Yes
<i>Provision of grants for energy efficiency measures</i>	Yes	Yes	Yes
<i>Promote the use of renewable energy</i>	Yes	Yes	Yes

Table 4.4 Governing through enabling in the three cases

In all of the cases, the municipality seems to have a facilitating intermediary role towards the local energy cooperative. Same as for the mode of governing, there are differences in how they fulfil this role as shown in Table 4.5. Every municipality facilitates by providing financial resources for the execution of the local energy cooperative activities.

In every case, the municipality has developed a policy for the execution of the energy transition. However, every four years there will be elections on a municipal and national level. Therefore, the policy and the focus within the energy transition may change. BWW, a local energy cooperative in 's-Hertogenbosch, recognizes the political dilemmas some politicians find themselves in. On the one hand, the newly chosen politicians have to go along with their voters, even these voters can be against an energy transition policy. On the other hand, the politicians have to agree on some sort of continuation of policy and associated agreements.

Facilitating intermediary role	Case I BRES	Case II O40Energie	Case III BWW
<i>Providing financial resources</i>	Yes	Yes	Yes
<i>Providing knowledge</i>	Yes	No	Yes
<i>Capacity building</i>	No	Yes	Yes

Table 4.5 Facilitating intermediary role in the three cases

Most of the local energy cooperatives are driven by idealism, they are willing to stimulate sustainability in all aspects within their city. This drive causes a willingness for participating in the development of a vision as well. The municipality of Breda already invites partners within the city to develop a climate program for the execution of the energy transition. BRES, the local energy cooperative in Breda, is one of them. O40Energie, the local energy cooperative of Eindhoven, wants to be involved in developing a vision as well, however, this has been rejected by the municipality till now. This rejection causes frustration and incomprehension and influences collaboration in a negative manner. In 's-Hertogenbosch, the focus is on building a network instead of on developing a shared vision.

4.1.4.4 Conclusion

Concluding, there are several ways of collaboration that appear in the case studies. Communication and group composition of the local energy cooperative can be decisive according to the cases. The enabling mode of governing and facilitating intermediary recurs in all cases.

4.2 DEFINE-PHASE

To verify the problems identified in the literature and case studies, two national and overarching parties were interviewed. The focus for these interviews was on the moment that most projects fail, the attitude of both parties, problems within this collaboration, and possible interventions for improving this type of collaboration. For the perspective of the municipalities, Platform31 was interviewed. Platform31 is a knowledge and network organisation for municipalities EnergieSamen represents the

perspective of the local energy cooperatives in this verification. EnergieSamen is an overarching organisation and interest group for local energy cooperatives. The protocol for this interview can be found in Appendix A. The transcripts of the interviews are located in Appendix B.

Platform31

Platform31 confirms that there are struggles within the collaboration between municipalities and local energy cooperatives. Regarding Platform31, the moment in the process most local energy cooperatives fail is the moment that promises should be kept. Suddenly, a subsidy is hard to provide or other departments of the municipality raise their concerns. At that moment, detailed questions are being asked to the local energy cooperatives, which will not be asked to other parties. It reveals a lack of trust of the municipality towards the local energy cooperative and fear for the unknown form of collaboration. On the other side, regarding trust, local energy cooperatives are hesitant for changes due to the elections that take place, every four years. Because due to the elections, the local energy cooperatives have proved that they are more permanent than the changing officials.

Besides trust, there are some other struggles as well. First of all, while starting a local energy cooperative, it is difficult to attract citizens to join a local energy cooperative. Especially, to attract the right citizens for the ideal team composition for establishing a local energy cooperative. These citizens are in the beginning not aware of the size of the project and there is a lack of knowledge about the process. In terms of juridical and financial aspects, knowledge is needed. The municipality, especially in case of local energy cooperatives, points out the importance of these aspects in the application for permits. For market parties, it seems that they have less strict application conditions.

The willingness of the municipality has an important impact on the realisation of the local energy cooperative. Platform31 states that the enthusiasm of the municipalities can be decisive because they do not have a procedure for supporting local energy cooperatives and it is not embedded in their current governance to focus on the cooperatives. This correlates to the fact that most municipalities do not have an overarching vision to concretely deal with the energy transition, especially the potential collaboration with local energy cooperatives.

Platform31 endorses the need for the municipality to act more like a responsive government. A responsive government should stimulate and collaborates with bottom-up initiatives (Steen, Scherpenisse, & Twist, 2015). Currently, the municipalities focus more on their performances, where there is seems to be no room for failure. Collaboration with local energy cooperatives may be too risky for realising their policy objectives, according to the municipalities. The municipalities attempt to be a responsive government by organising participation evenings. However, these evenings are mostly organised at a late stadium in the process, in which citizens do not have that much influence on the objectives anymore. Therefore, it can be stated that the municipality is still acting as a performing government instead of being a responsive government.

Platform31 concedes that the municipality has to conform to the policies of the national government. Besides that, over the last couple of years, several governmental tasks have been assigned to the municipalities. Besides the energy transition, they have to facilitate multiple tasks in the social domain. The shift in tasks from the national governments towards the local governments did not result in more capacity for the municipalities. Besides that, these tasks, have priority over the energy transition and therefore the municipality is more focused on realising their social tasks than the energy transition.

Regarding local energy cooperatives in the energy transition, the municipality needs to create conditions and instruments that facilitate these cooperatives. Currently, in general, the municipalities do not have a vision regarding the local energy cooperatives. For developing these conditions and instruments, the municipalities may need to ask themselves what the added value of these cooperatives is and what their current instruments are to facilitate them. By acting upon these answers and creating opportunities,

the citizens may feel more supported in realising the energy transition. Besides, the municipality needs to acknowledge the voluntary character of the cooperatives. In the example of the municipality of Haarlem, the initiators of the local energy cooperative partly work voluntarily and partly get paid based on a social hourly rate. This example shows the possibilities for both parties supporting each other in establishing the energy transition together.

EnergieSamen

The verification by Platform31 is partly shared by EnergieSamen. The moment of failure of these projects, regarding EnergieSamen, is the moment that the local energy cooperative is moving towards being a professional party and revealing entrepreneurship. This is the moment that the relationship between the municipality and the local energy cooperative is changing. In this transformation, the conceptual ideas begin to become concrete and realistic. In the case of market companies, the municipalities developed procedures to facilitate their collaboration. Collaboration with citizens and local energy cooperatives is a new type of collaboration and the municipalities have not adjusted yet to this new form. The reveal of entrepreneurship raises questions for the municipalities, especially regarding the transparency and fairness towards other market parties. The municipality asks for juridical and governance frameworks to position the local energy cooperatives, and especially the collaboration with them.

The group composition of the local energy cooperative can withhold the cooperative to become a professional party in the energy transition. For the transition from voluntary towards a professional party, management skills are required. EnergieSamen addresses the importance of these cooperatives to become professional in case they want to grow and realise more than one project. The professionalization of the local energy cooperative is related to efficient use of resources, such as capital, as well. In the current situation, a local energy cooperative asks for subsidy and the municipality starts asking detailed questions about the activities, objectives, and conditions. Not all these questions can be answered by the local energy cooperative and the project will be delayed combined with frustrations that start to arise. The municipality may support by informing about the available resources and the conditions, where the local energy cooperative may be challenged to use these available resources efficiently.

EnergieSamen confirms the important aspect of local embeddedness. Market parties can focus on another location or municipality in case of changing policies or counteracting procedures. For the local energy cooperatives, there is no alternative. The local embeddedness becomes, for example, a struggle in case of changing policies. By then, their investments in terms of money and time might get lost. Changing policies will appear, due to the four-yearly elections, however overarching procedures offer possibilities for supporting the local energy cooperative a long term role in the establishment of the energy transition.

Besides that, the procedures for subsidy are time-consuming. In some cases, the procedure takes more time than the actual execution of the project. Knowledge about these procedures needs to be shared. Not only knowledge about the procedures should be shared, knowledge about arranging capital and to attract knowledge about managing a local energy cooperative. Currently, municipalities have a lack of capital and human resources. Therefore, knowledge sharing by the municipality and knowledge assurance is deficient.

The problem regarding EnergieSamen is the lack of an overarching vision from municipalities towards local energy cooperatives. For developing a vision about the local energy cooperatives, the municipalities need to have an interest in the existence of the cooperatives. For the municipality, these local energy cooperatives can be a relatively small investment for the realisation of their own

sustainability goals. By arranging their vision, internal procedure and their instruments, municipalities should be able to truly support and facilitate the cooperatives.

Currently, there is no standardized procedure for local energy cooperatives to collaborate with municipalities. EnergieSamen gives the example of the municipality of Amsterdam where the local energy cooperatives can receive subsidy per phase of the project. Therefore, the municipality is in control and the local energy cooperative can realise its objectives per phase. For example, in the first phase, the municipality can ask for a certain level of organisation within the cooperative before granting subsidy. For the last phase of the project, a loan instead of a subsidy is being granted to stimulate the eventual independence of the local energy cooperative. This type of overarching and stimulating procedure is absent in Breda, Eindhoven, and 's-Hertogenbosch and may have a positive influence on the collaboration between the municipality and the local energy cooperative. Besides that, the municipalities have to develop a vision regarding the local energy cooperatives and to position the cooperatives within the juridical domain. The vision and resulting policy and governance arrangements should focus on the organisation of the cooperatives and on the instruments to facilitate development and collaboration. Before starting collaborating, both parties together need to discuss the objectives and conditions of the collaboration. In this meeting, the focus should be on different roles, expectations, and available resources.

4.2.1 Defined problem

The literature study and the case studies provided insights into the collaboration between municipalities and local energy cooperatives. These insights are verified in the interviews with the overarching national parties. Resulting from these insights, the problems for collaboration are defined. Besides the barriers for collaboration, there are more insights from the literature study, case studies, and verification interviews that need to be taken into account

First of all, the barriers to the problem statement are defined in depth. These problems are identified in Figure 4.11. The 'attitude of the municipality' is caused by the need for transparency by the municipality. They have to treat every party impartially. Besides, the municipality consists of several departments and associated objectives. Within the communication towards the local energy cooperative, the municipality may be confusing. One department may agree upon a project, where another department may reject the same project. Besides that, the municipality has to conform itself to the national policy, that might be changing as well. Before collaborating with local energy cooperatives, the municipality should be organised to be able to join this collaboration. By developing an overarching vision and procedure, the municipality can provide clarity for the local energy cooperatives. It has been acknowledged by all the interviewees that the capacity of financial and human resources within the municipality is lacking. Therefore, alignment between the two parties and sustainable collaboration are requirements for effective use of the resources. Skills within the juridical and financial domain are decisive in the 'group dynamics and group composition of the local energy cooperative'. By including expertise in these domains in the local energy cooperative, the cooperative can become a professional organisation. The level of professionalism creates trust for the municipality for establishing the project. 'Ignorance' is present in both parties. For the local energy cooperative, the process of collaboration is not clear and their expectations are not in line with reality. The same applies to the municipality. This is partly due to a lack of an overarching vision of the process.

Second of all, two moments in the process can be identified as the moment that most local energy cooperative project fail. Failing means that the project comes to a stop before realising the objectives. The first moment of failing is the moment of starting a local energy cooperative. The skills of the interested citizens need to connect, and preferably they know the juridical and financial domain. Besides, the citizens involved need to be persistent, because the procedures regarding these projects

can be long-lasting and unclear. The second moment of failing is the moment before the realisation. This is the moment the plans will become undeniable. To prevent unnecessary failure in these moments in the process, attention should be drawn to these moments in the process. For establishing an energy transition, the local embeddedness is highly important to the local energy cooperatives. Therefore, a collaboration with the municipality is required. The collaboration between the local energy cooperatives and the municipalities is a relatively new type of collaboration. Municipalities have to develop new arrangements in which citizens can collaborate. The focus within these arrangements should be on governing through enabling. Besides that, a facilitating intermediary role of the municipality can stimulate the local energy cooperatives in contributing to the energy transition. Communication and evaluation may improve this collaboration, to understand the attitude of the municipality and to reduce the lack of knowledge. For the implementation of the new type of collaboration, according to the transition perspective of Strategic Niche Management, it is important to focus on knowledge, learning, and collaboration. Experimenting with the process design on small scales and improving the design by evaluation offer opportunities for the implementation on a larger scale.

By defining the problem and stating the aspects that need to be taken into account for the design, the Define-phase and the first diamond of the Double Diamond are completed.

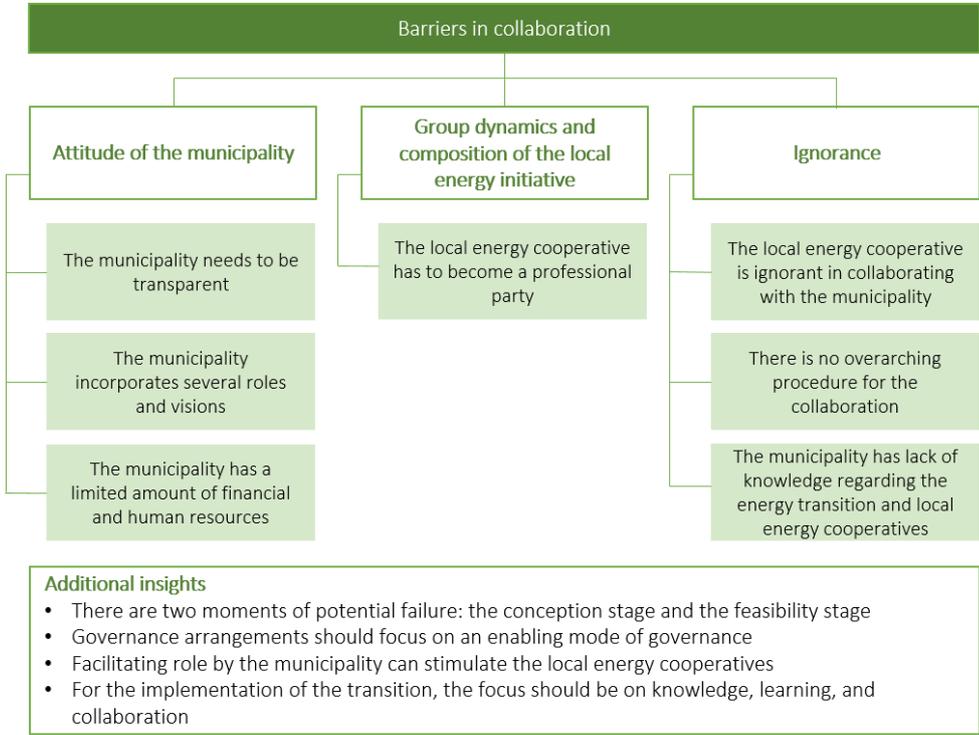


Figure 4.11 Defined problem

Design

Develop

Deliver



After stating the defined problem, in this chapter, the second diamond of the Double Diamond method is discussed. In this second diamond, the develop and deliver stages are executed as shown in light green in Figure 5.1. Using this method, the following sub-question is answered: *How can the insights be incorporated and validated to facilitate the collaboration between municipalities and local energy cooperatives?* At the end of this chapter, a validated design to the defined problem is presented.

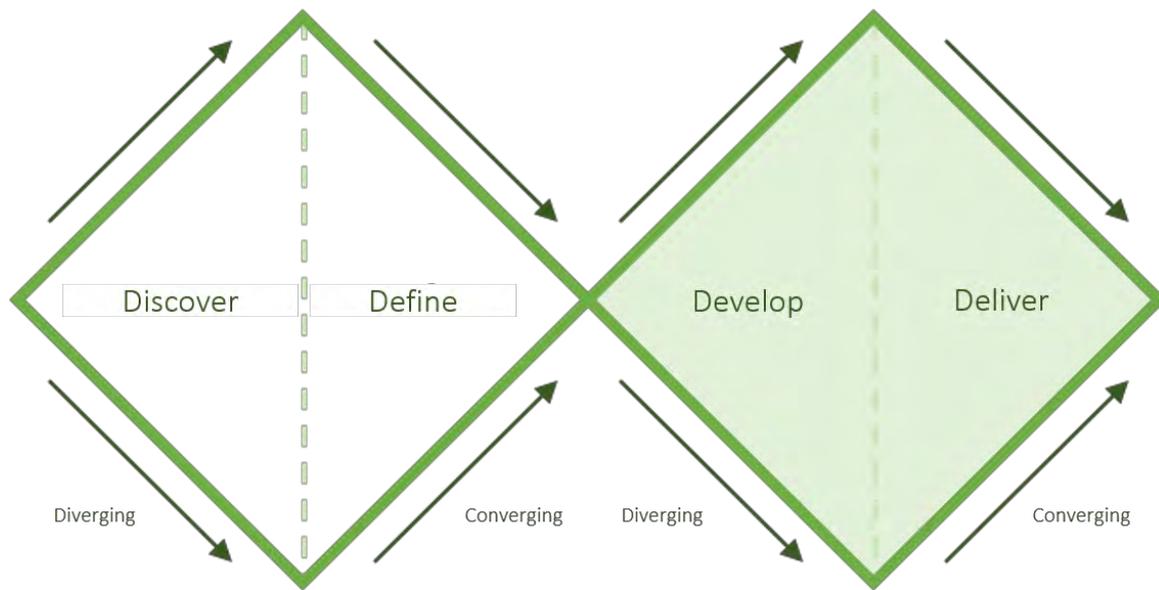


Figure 5.1 Double Diamond method in chapter 5 (adapted from Design Council, 2007)

5.1 DEVELOP-PHASE

In the second diamond of the Double Diamond method, a design is created. During the verification interviews with the overarching national parties, it seems to be valuable to design a process for the collaboration between the two parties. A shared procedure could provide transparency between the two parties. The question is how the insights from the previous phases can be incorporated into a process design which facilitates the collaboration between municipalities and local energy cooperatives. For answering this question, in the Develop-phase, other areas and sectors are studied to abstract valuable insights for the process design. The focus for studying the other areas and sectors is the collaboration between citizens and governments. The concepts of Collective Private Commissioning ('Collectief Particulier Ondernemerschap' (CPO)), neighbourhood compass ('Wijkkompas'), natural gas-free neighbourhoods program ('Programma Aardgasvrije Wijken (PAW)), and the participation steps of the municipality of Breda are studied. In Table 5.1 the reason for the selected areas of research is explained. The four areas are studied and the activities per stage of project development are described. The complete design process can be found in Appendix C.

Area of research	Reason for research
<i>Collectief Particulier Ondernemerschap (CPO)</i>	A citizen's collective initiates for collaboration with the municipality for establishing their objectives
<i>Wijkkompas</i>	Municipalities initiate collaboration with citizens to stimulate the heat transition
<i>Programma Aardgasvrije Wijken (PAW)</i>	Municipalities initiate for collaboration while having a directioning role in stimulating the heat transition
<i>Stappenplan Participatie Breda</i>	Municipality informs their citizens about participation with the municipality

Table 5.1 Reasons for research

For structuring the process design and the study of the other areas, the stages of project development of community-focused energy projects are applied. In the literature, four stages of project development in community energy projects are identified (Haggett et al., 2013); conception stage, feasibility stage, planning stage, and operation stage.



Figure 5.2 Stages of project development in community energy projects (abstracted from Haggett et al., 2013)

Within the model of Haggett et al. (2013), there seems to be no separated execution stage. A study of CPO and Wijkkompas shows that a separate stage for execution is included. Resulting in a process of five stages instead of four as shown in Figure 5.3.



Figure 5.3 Project development stages for the process design (own illustration)

Reflecting on the researched cases, Figure 5.3 describes the process of BWV, the wind cooperative in the municipality of 's-Hertogenbosch. For the advice cooperatives, similar to BRES and 040Energie in respectively Breda and Eindhoven, their process may be considered as a continuous process of activities and projects. For every new project in their collaboration with the municipality, the stages of project development will have to be passed. The process of these cooperative can be visualised as in Figure 5.4.



Figure 5.4 Project development stages for advice cooperatives (own illustration)

For comparing and understanding the other sectors and areas, the division of stages in Figure 5.3 is applied. An overview of the aspects that need to be taken into account per stage is provided in Table 5.2.

First of all, the conception stage is being studied. In this first stage, the most important aspect is to internally organise the parties. According to the PAW and Wijkkompas, it is important to create clarity about the assumptions and purpose of the process in this first phase. Wijkkompas states that before being able to align these assumptions and purpose, the parties need to clarify their ambitions, interests and prioritisation for themselves. Besides that, according to the participation plan of the municipality of Breda, the parties need to map the potential stakeholders of the project and what their influence may be in the project. PAW endorses that both parties need to understand their role in the energy transition and potential collaboration. For their role in the energy transition, it is important to connect to the

existing provincial and municipal policies and the Regional Energy Strategy (RES). The PAW adds the importance of the substance of the role of the parties in establishing collaboration and developing a project. As recommended by the Wijkkompas, after the internal organisation, the competent members of the parties are joining the first meeting to discuss the assumptions and purpose of the process. Starting the collaboration between the two parties, agreements regarding the collaboration should be constructed. Studying the areas of research, the purpose of the conception stage is to map the interests, roles, and expectations regarding the project and to construct agreement for the collaboration to establish the project.

The conception stage is followed by the feasibility stage. CPO states, the collective of citizens need to be officially registered as an association or cooperative for establishing a project. After that, agreements between the two parties have to be made regarding the zoning plan and the urban development plan to assure there are no conflicts with the development plan. According to Wijkkompas, for the funding and potential subsidy for the project, the possibilities need to be researched in this stage. Besides that, the collective of citizens will further elaborate on the plans for the project. In the participation plan of the municipality of Breda, the feedback of the municipality on these plans from the collective of citizens are considered important. Besides that, feedback on the feasibility of the project needs to be provided. CPO acknowledges the importance of developing a business case in which the risks for the projects are being described. Examples of these risks are the withdrawal of members during the project and the possibility of unsold parts of the project.

At the end of this stage, the areas of research endorse that both parties agreed upon the plan, the collaboration, and the contribution of each party to the project. Also, in the participation plan of the municipality of Breda, attention is drawn to the relevance of clarity about the interpretation of interim meetings. Concluding, in the feasibility stage, the early involvement of both parties in the project is the most important. Therefore, the purpose of the feasibility stage is the alignment between the two parties and the elaboration on the plan.

After agreeing upon the collaboration, the planning stage for more details of the plan can be started. According to the CPO, the citizens need to develop a collective program of requirements to share with potential contractors. After that, together with experts, a final design is created. The final design is required for the application of the environmental permit. After granting the necessary permits, the execution can take place. Concluding, the purpose of the planning stage is to elaborate the project into detail for execution. The purpose of the execution stage is the execution of the project according to the agreements the parties made on beforehand.

Starting the execution stage, according to Wijkkompas, expectations about the execution and the role of both parties need to be declared and aligned. Besides that, agreements about the amount and substance of updates during the execution are made. After all the agreements and preparation, the execution of the project can start. During the execution itself, CPO states that all the costs need to be updated and controlled.

After constructing or executing the project, the operation stage follows. CPO and Wijkkompas state that there are several options for the operation stage. First of all, the municipality can be responsible for the operation of the project, and the local energy cooperative withdraws from the project. In the second option, the roles are reversed, the municipality withdraws from the collaboration and the local energy cooperative manages the operation stage of the project. In the final option, both parties together are taking responsibility for the operation. Agreements about this shared responsibility have to be made together. After choosing one of the options, the evaluation of the project needs to take place. Both parties together should derive lessons learned about the process of collaboration and evaluate the

development of the project. An overview of the aspects that need to be taken into account is shown in Table 5.2.

Stage	Aspects to take into account
<i>Conception stage</i>	<ul style="list-style-type: none"> • Competent people are joining the process • Clarity about the assumptions and purpose of the process • Clarity about the ambitions, interests, and prioritisation of the involved parties • The substance is given to the role of the parties in the process to arrive at a plan • All the stakeholders of the process are mapped • Overarching policies and the Regional Energy Strategy (RES) should be taken into account • There are agreements about the way of collaboration
<i>Feasibility stage</i>	<ul style="list-style-type: none"> • The collective of citizens need to be registered as an association or cooperative • Agreements between the two parties have to be made regarding the zoning plan and the urban development plan • Possibilities for funding and subsidy need to be researched • The municipality has to provide feedback on the plans of the citizens • The feasibility of the plan is being studied by the municipality • The citizens have to develop a plan for the withdrawal of members and unsold parts of the project • Parties should both agree upon the plan, the collaboration and the contribution of each party • Clarity about the interpretation of the interim meetings
<i>Planning stage</i>	<ul style="list-style-type: none"> • The citizens develop a collective program of requirements • The final design is created for the application of the environmental permit
<i>Execution stage</i>	<ul style="list-style-type: none"> • All the expectations of both parties about the execution are being declared and aligned • All the costs are being updated and controlled during the execution • Agreements about updates between the two parties are made • Construction or the execution of the project starts
<i>Operation stage</i>	<ul style="list-style-type: none"> • A decision about operation executed by the municipality, by the citizens, or both • Agreement about the operation stage • Evaluation by the municipality and the citizens collective together

Table 5.2 Aspects that need to be taken into account per stage

5.2 DELIVER-PHASE

The results from the develop-phase are taken into account for developing the first process design. The requirements for the process design resulted from the defined problem in the define-phase. This led to a process design which is discussed in this section. The process design is validated by the interviewees via an online survey. This online survey was divided into two parts; validating the substance of the process and validating the process in general. The online survey led to the final and validated process design. The online survey can be found in Appendix D, and the results from the online survey are shown in Appendix E. In this section, the feedback of the participants of the survey is discussed and the validated process design is presented.

After researching other areas during the develop-phase, it became clear that both parties go individually through their process. During this process, there are some moments in time where there should be a meeting between the two parties. These processes and corresponding meetings can be combined into a swimming lane diagram. The swimming lane diagram offers possibilities to reveal the processes of the two parties and the tasks they have been assigned to. Besides, the diagram shows a sequence of the entire process (Jeyaraj & Sauter, 2014). This diagram formed to the basis for the process design as shown in Figure 5.5. The lane of the 'municipality' and the 'local energy cooperative' represents the activities that have to be executed by the actors. The activities 'meeting' lane in the middle serves as the meetings for alignment between the two parties. These lanes pass through the five defined stages of project development.

The purpose of the overall process design can be summarized in three aspects; (1) the internal organisation of both parties, (2) knowledge sharing about the energy transition and local energy cooperatives, and (3) clarifying the collaboration and communication during the process of project development. Together this supports the realisation of a cooperative project. This was acknowledged by the participants of the validation survey. The interpretation of the aspects per stage can be found in the substance of the separated stages.



Figure 5.5 Overview of the process design

5.2.1 Conception stage

In Figure 5.6 the validated process design for the conception stage is shown. The idea of starting a local energy cooperative can be originated in two ways. A collective of citizens who are willing to stimulate the energy transition in their city may initiate the first idea. Alternatively, the municipality promotes for developing local energy cooperative, which may take place in a certain region of the city. In both cases, the collective of citizens and the municipality need to be aware of the fact that they need each other to develop the project. Before the first contact between the two parties, the parties have to internally organise themselves. After aligning the roles, expectations, interests, and the purpose of the project, the collective of citizens and the municipality can start collaborating.

Validation

The substance of the conception stage is discussed by the participants of the validation survey. The participants acknowledge the difficulty for the local energy cooperatives of finding the correct information. This is information about the vision of municipality and information about a potential collaboration with the municipality. For this collaboration, it is unclear what the conditions and expectations for collaborating are. The participants confirm the importance of internal organisation before the first meeting between the two parties. However, it is not the only important aspect of this phase. Open-mindedness of the parties during the first contact is considered to be important as well.

The purpose of this conception stage is to map the interests, roles and expectations of both parties for clarification, this is acknowledged by all the participants.

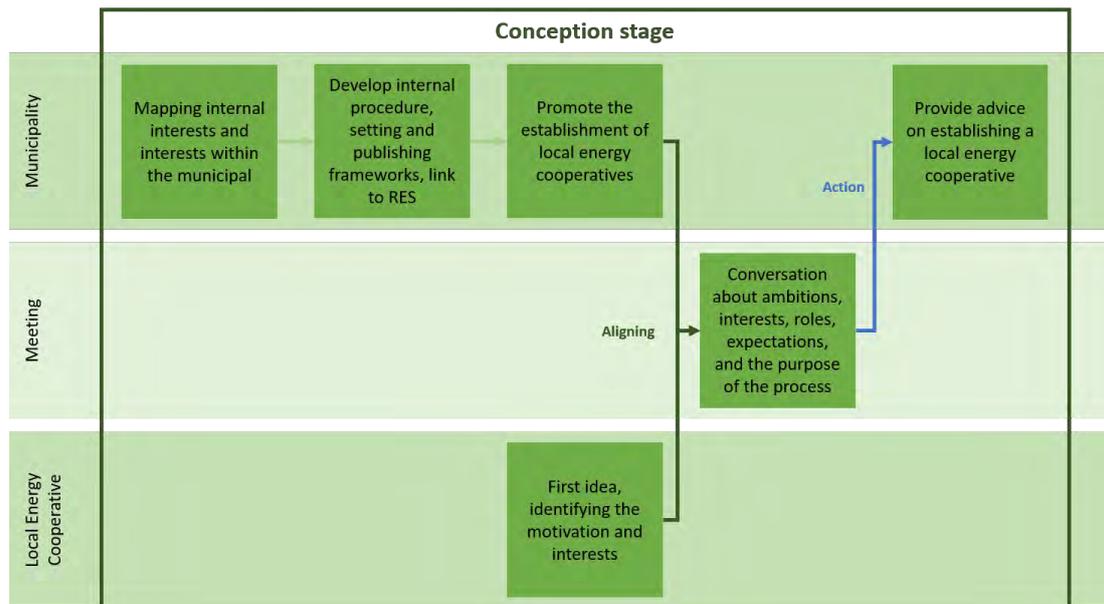


Figure 5.6 Validated Conception stage

5.2.2 Feasibility stage

Figure 5.7 shows the validated feasibility stage of the process design. Within this stage, agreements about the development of the project and agreement about the collaboration are being established. The collective of citizens becomes an official cooperative or association after which the finances of the project are acquired. Possibilities for investments, funding, and potential subsidies are being researched. The municipality acts as a facilitating intermediary by providing information about financing options and the associated conditions. In the end, this will lead to a business case provided by the local energy cooperative. The financing of the project is explained and risks are described. For example, the risk of withdrawal of members and unsold parts. The same applies to the plan of action. The business case and the plan of action are reviewed by the municipality and feedback is given.

Validation

According to the participants of the validation survey, there are multiple feedback loops within this feasibility stage. In case the municipality has feedback on the business case of the local energy cooperative, for example, the cooperative has to incorporate this feedback before entering the following activity, the application for subsidy. The participants are divided about the leading role of the municipality or the local energy cooperatives during the project. On the one hand, the power of citizens is endorsed. In case they are leading during the project, there is a considerable chance that the citizens continue the project in their enthusiasm. On the other hand, participants state that the leading role should be discussed between the two parties during the meetings. The reason for that is that it might differ per project which party is willing to have the leading role in the project. It should not be automatically assumed to be the municipality or the local energy cooperative, it should be decided by mutual agreements.

For the feasibility stage, the purpose is to align both parties for the collaboration and to elaborate on the project. The participants partially agree with this stated purpose. It should be mentioned that the agreements between the two parties have to be signed in the form of a letter of intent to avoid conflicts in a later stage of the project. Besides that, the subsidy of the municipality should not be an end but a means for the local energy cooperative. Other methods for financing should be researched as well.

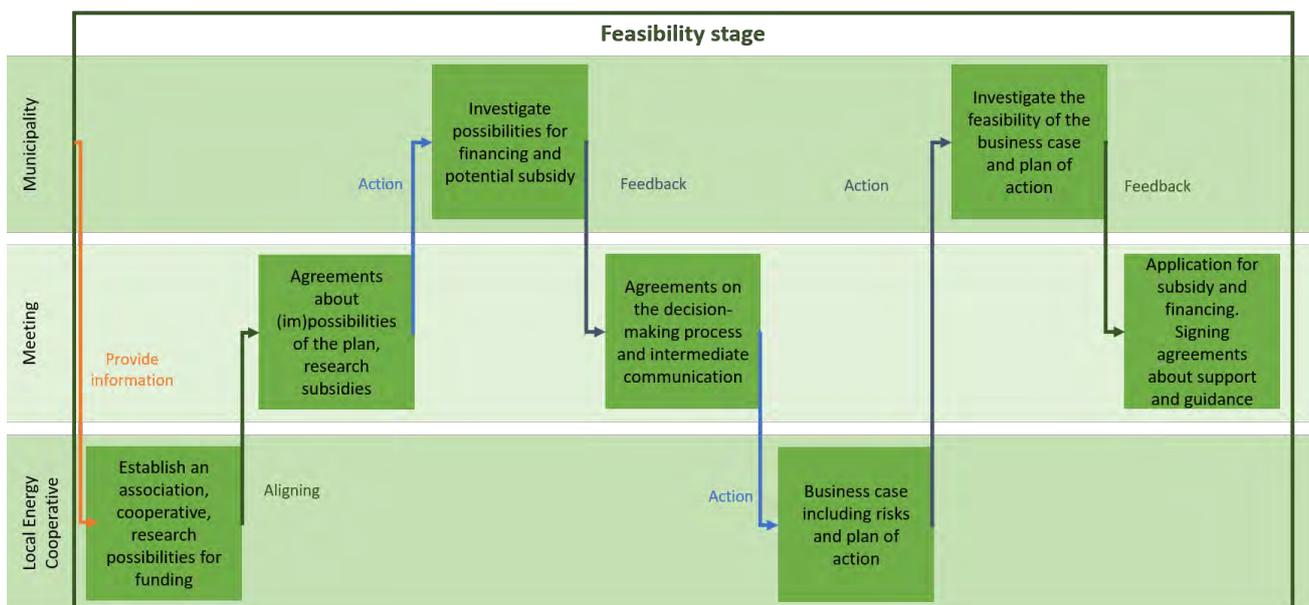


Figure 5.7 Validated Feasibility stage

5.2.3 Planning stage

In Figure 5.8 the validated planning stage is presented. Within this stage, the preparations for the execution stage are completed. The enabling and facilitating role of the municipality is expressed in granting the subsidy for which the local energy cooperative applied and providing support in the activities of local energy cooperative in the planning stage. This encourages the development of the final design of the project and the plan for the execution of the project. These products are needed for the application for potential permits for construction of the project. By obtaining these permits, the project is prepared to be carried out.

Validation

The participants of the validation survey state the level of guidance or support by the municipality differs per project. The group composition of the local energy cooperative can be decisive in this matter. In case the citizens within the local energy cooperative have the skills and the network to develop the final design and plan for execution by themselves, additional support from the municipality might not be needed. The same applies to the permits, this differs per project. For some projects or locations, a permit may not be needed. Besides, permits may not only be regarding a certain location or the environment of the location. In the case of the collective purchase of solar panels, for example, a permit is needed for the guidance of this purchase. Clarification about the permit procedures should be given by the municipality in meetings between the municipality and the local energy cooperatives.

The purpose of the planning stage is to specify the project for execution and is recognized by the participants of the validation survey.

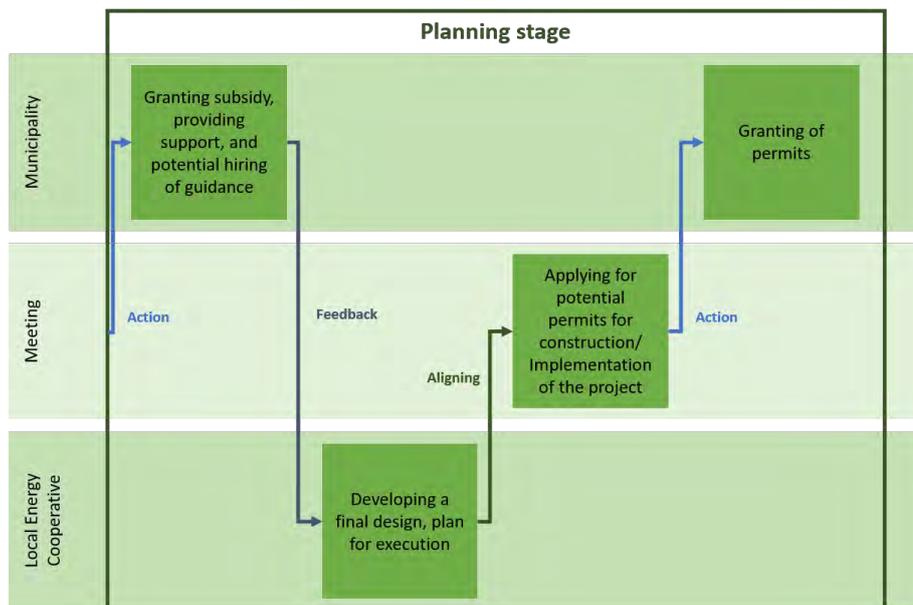


Figure 5.8 Validated Planning stage

5.2.4 Execution stage

Figure 5.9 shows the validated execution stage. In this stage, the constructing or implementation of the project starts. Agreements upon this execution should be made between the municipality and the local energy cooperative. Besides that, the amount of involvement of the municipality needs to be discussed. In principle, the project is executed by the local energy cooperative. However, depending on the available skills and capacity within the local energy cooperative, support by the municipality might be necessary. During the execution stage, progress meetings are organised. The progress of the project is discussed, updates about the costs are provided, and potential adjustments to the project are reviewed. These progress meetings are important to avoid protracted conflicts and miscommunication during the execution stage.

Validation

The participants of the validation survey confirm that the role of the municipality during the execution stage depends on the skills available within the local energy cooperative. Regardless of the role, the municipality has in the execution stage, information about the progress of the project should be provided by the local energy cooperative. It should be taken into account that the capacity of the municipality regarding the energy transition is not always sufficient. It may depend on the size of the project and the competences, but in reality, the capacity of the municipality is lacking to sufficiently support the local energy cooperative when it is needed. The adequacy of the capacity of the local energy cooperative depends on the size of the project and the available skills within the cooperative. The question is whether these skills are sufficient enough for executing a qualitative satisfactory execution of the project. Therefore, the parties should keep informing each other about their resources and possibilities for acquiring more resources.

For the operation stage, the purpose is the execution of the project according to the agreement between the two parties. This is agreed upon by the participants of the validation survey.

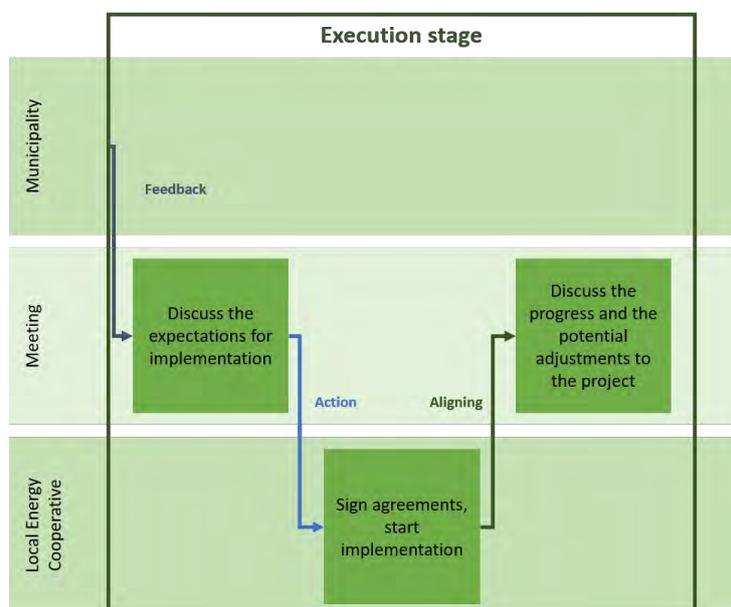


Figure 5.9 Validated Execution stage

5.2.5 Operation stage

The validated operation stage is shown in Figure 5.10. Within the feasibility stage, agreements about the operation stage have to be observed. There are several options for the operation stage; it may be managed by the municipality, by the local energy cooperative, or both. Regardless of this choice, a joint evaluation needs to take place. Both the municipality and the local energy cooperative reflect on their process, the collaboration during the process, and the process design. By doing this, lessons learned for new local energy cooperative can be abstracted. Besides that, the process design of the municipality collaborating with local energy cooperatives can be complemented and updated before entering a new collaboration.

Validation

All the participants of the validation survey acknowledge the importance of knowledge assurance and sharing, because it may improve the collaboration between the municipality and local energy cooperatives. It is stated that reinventing the wheel for developing a local energy cooperative and collaborating with the municipality have happened before, and should be prevented by sharing knowledge about these processes. The operation and evaluation of the project are the purposes of the operation stage, this is acknowledged by the participants of the validation survey.

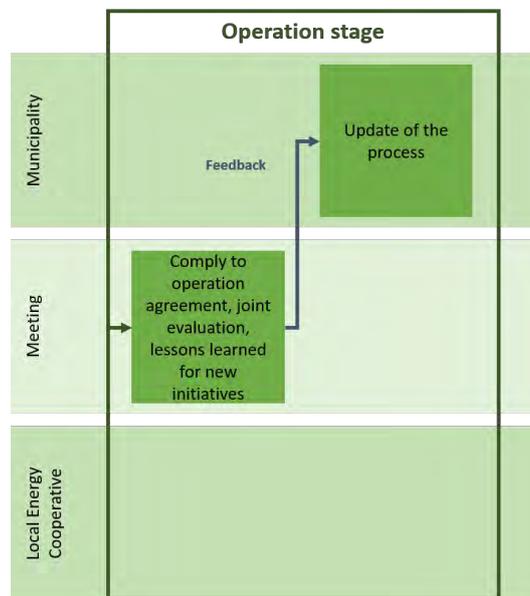


Figure 5.10 Validated Operation stage

5.2.6 Validated process design

All the validated stages led to a validated final design which is shown in Figure 5.11 and Appendix F. For the implementation of the process design into practice, the municipalities should provide this design to the local energy cooperatives. The Energy Counter ('Energie Locket'), which is available within municipalities and regions, offers opportunities to inform citizens about this process design. By stating the necessary activities for the stages, the municipality can support or reject a project of a local energy cooperative on a substantiated basis. Besides, the first activities of the process design focus on the internal organisation of the parties. After identifying the needs and objectives of the individual parties, the parties are challenged to discuss these together. By sharing the same objectives during the project development, stimulates the collaboration. Following the structure of the process, design clarifies the collaboration and communication for both parties during the process of project development. The process design offers insights and knowledge about the necessary activities regarding local energy projects. During the process, iterations regarding the process design can be made to improve the design.



Figure 5.11 Validated process design

Discussion

Scientific relevance

Applicability of the research



In this research, the focus is on barriers in the collaboration between municipalities and local energy cooperatives for stimulating the energy transition and how to overcome these barriers. Over the last couple of years, the energy transition is becoming more relevant, however, the implementation of this transition is lacking. In this chapter, the scientific relevance of the building blocks used throughout the research and the applicability of the research are assessed.

6.1 SCIENTIFIC RELEVANCE

The research resulted in a process design to structure the collaboration between the municipality and the local energy cooperative. For the scientific relevance of this study, several aspects are being addressed. First of all, the geographical location of the selected cases. Secondly, the reason for the development of a process design. Thirdly, the level of participation of local energy cooperatives in the energy policy of the municipality. Fourthly, the deepened attitude of the municipality. Fifthly, the internal organisation of the municipality. Lastly, the studied aspect of collaboration.

Case selection

For studying the collaboration between municipalities and local energy cooperatives, three cases in North-Brabant are studied: BRES in Breda, 040Energie in Eindhoven, and BWW in 's-Hertogenbosch. The studied cases are located in three relatively large cities in one of the provinces of the Netherlands. Every province in the Netherlands has its culture, norms and values. It is assumed that in the province of North-Brabant the people are open and willing to support each other. Therefore, it is conceivable that studying this collaboration in another province may offer different results. Besides, the size of the cities has an influence. In line with the study of Hoppe et al. (2016), the case studies and verification interviews of this research reveal the influence of the relatively large cities. Besides the cultural differences, these relatively large cities can organise a department for stimulating the energy transition. Within these departments, the municipality can monitor and support the local energy cooperatives. In smaller cities, this is more difficult to organise. Besides, the range of duties of the municipalities has expanded over the years, but the human and financial resources did not. Relatively large cities are having fewer problems dealing with these changes in comparison to the smaller cities. This implies that applying the research on different sizes of cities could give different results. Studying different sizes and different geographical locations could offer opportunities for improving the validity of the process design and opportunities for offering tools and processes for smaller cities to be able to support and monitor local energy cooperatives.

Process design

The outcomes of this research fit into the context of the studies of Arnouts et al. (2012) and Howlett and Rayner (2007). These studies state that governance arrangements can facilitate collaboration between governments and citizens. These arrangements are defined as a consistent combination of instruments, processes, and networks. During the case studies, it became clear that the component of process is missing in practice. Most of the municipalities do not have a defined overarching process available for the collaboration between municipalities and local energy cooperatives. In the municipality of Breda, a yearly contest for energy transition projects is being held which indicates a defined process. The collaboration between the municipality of Breda and BRES seems to be sustainable as a result of a structured process of the first stages of project development. In these two stages, the conception and feasibility stage, the expectations and communication between the two parties became aligned. The municipalities of Eindhoven and 's-Hertogenbosch did not have an overarching procedure for the collaboration with local energy cooperatives. The municipality of Eindhoven argued that the development of a standardised process is hard, because of the differences among the local energy projects. There are differences in the type of projects and level of needed support. Therefore, the municipality of Eindhoven questions whether a standardized procedure can answer to the problems in the collaboration for every local energy project. However, the case of 040Energie in Eindhoven reveals conflicts in the alignment between the two parties, because of a lack of a clear procedure. Besides, the

arguments of the municipality of Eindhoven are objected by EnergieSamen and Platform31. These overarching national parties advocate for a process design to clarify the activities that need to be executed per party despite the differences per project. The project development stages will be similar for every project. In addition, these two national parties state that both the municipalities and the local energy cooperatives need to internally organise themselves. By being internally organised, the parties can indicate what they need from the other parties to execute the project. Implementing a process design for the collaboration between municipalities and local energy cooperatives supports the theoretical concept of governance arrangements.

Level of participation

The outcomes of this research add new insights to the studies of Bulkeley and Kern (2006) and Warbroek (2019). An enabling mode of governing applied by the municipality is beneficial to local energy cooperatives. Besides, by acting as a facilitating intermediary between a local energy cooperative and other parties, the municipality can stimulate the cooperative and the energy transition as well. In the three case studies, it became clear that the enabling mode of governing and the facilitating intermediary role are predominant. However, the presence of these aspects does not automatically lead to a sustainable collaboration. In practice, the level of participation of the local energy cooperative in the municipal policy regarding the energy policy is important. In the cases of BRES and BWW, located in Breda and 's-Hertogenbosch, the municipality is willing to learn from the local energy cooperatives and invited these parties to provide feedback on their policy regarding the energy transition. The local energy cooperative of O40Energie in Eindhoven is willing to share their knowledge regarding policies as well, however, the municipality has rejected their requests. This rejection of the municipality of Eindhoven causes frustration, where the involvement of local energy cooperatives in Breda and 's-Hertogenbosch stimulates the collaboration. Therefore, it is important to not only provide knowledge to the local energy cooperative but to receive knowledge from the local energy cooperative as well.

Attitude of the municipality

In the current scientific literature, the focus is on governments initiating projects for establishing an energy transition (Corsini et al., 2019; Moallemi & Malekpour, 2018), or the focus is on citizens starting an energy transition initiative and their difficulties regarding the development and execution (Seyfang et al., 2014; Yi et al., 2017). However, in this study, the focus is on the municipalities and their governance in the collaboration with local energy cooperatives. Executing this study, it seems that the identified barriers in collaboration originate from structural aspects. During the case interviews, the municipalities endorse their multiple positions in society. These positions are represented by the departments within the municipality. Each of these departments has its objectives and visions, which might conflict with each other. Besides, in the case interviews, it is mentioned that the municipality has to be an independent and transparent partner in collaboration. Favouring a local energy cooperative without questioning other possible parties may imply favouritism. The multiple departments and their desired independence are explanations for the attitude of the municipality. In addition, the overarching national parties mention the lack of a juridical position of local energy cooperatives in the collaboration with municipalities. Therefore, the municipality does not know how to collaborate with these cooperatives. All these insights deepened and declared the barrier of the attitude of the municipality. This contributes to the development of a design in which the governance of the municipality is used for establishing a sustainable collaboration between municipalities and local energy cooperatives.

Internal organisation of the municipality

Previous studies in the literature state that the attitude of the municipality depends on the enthusiasm of the mayor and its responsible officers, Besides, the municipalities tend to approach the local energy cooperatives as consumers instead of actors (Oteman et al., 2017; Young & Brans, 2017). Besides, the study of Nochta and Skelcher (2020) states that municipalities are not designed to deal with local energy cooperatives and the energy transition. In addition to these studies, the municipality as an unambiguous actor is revealed in this research. During the case studies, the interviewees addressed the several

departments and roles within the municipality. Therefore, it can be hard for the municipality to support local energy cooperatives. Despite the willingness of the municipal department responsible for the energy transition, the execution of the local energy project may conflict with another municipal department and rejected in a later stage of the project. Therefore, developing an internal procedure regarding the energy transition offers opportunities for the municipality to cope with these conflicting perspectives.

Collaboration

For this research, the collaboration between two actors is studied. However, the aspect of collaboration is hard to capture. Sustainable collaboration may not be established by the application of a structured process design, there are psychological components that influence the collaboration as well. The actions within the process design attempt to create boundary conditions for the development of these psychological components. The outcomes of this research are in line with the mentioned aspects of De Ridder and Noppen (2009). For example, the component of trust is important for the realisation of the project of the local energy cooperative. However, it is hard to identify the conditions for establishing trust. It is hardly possible to assume that the actions of the designed process design will automatically result in trust in the collaborating partner. However, by being transparent about the process and fulfilling the agreements that are made, the boundary conditions for trust are present.

6.2 APPLICABILITY OF THE RESEARCH

By implementing the process design in practice, the municipalities and local energy cooperative will be able to improve their collaboration regarding the energy transition. For the application of the process design, first of all, the perspectives of Strategic Niche Management and Transition Management need to be taken into account. Secondly, the type of local energy cooperative can influence the outcome. Lastly, the challenges for incentives in the energy transition can affect the applicability of the research.

Perspectives on transition

This research provides insights into the dynamics between two actors in the energy transition, the municipalities and the local energy cooperatives which resulted in a process design. This process design attempts to overcome the addressed barriers in collaboration in the energy transition. The developed process design is in line with the perspectives of Strategic Niche Management and Transition Management (Falcone 2018; Kemp, Schot, et al. 2007). The projects of local energy cooperatives can be seen as these niches or transition arenas. These perspectives focus on learning from societal experiments, developing shared objectives, and collaboration in small niches or transition arenas. During the case study of BWW, it became clear that the municipality of 's-Hertogenbosch had learned from earlier projects and was, therefore, more able to support the local energy cooperative and more able to stimulate the energy transition. In the development of the process design, these aspects are taken into account. There are designated moments within the process design for knowledge sharing and collaboration. During the overall process, the municipality is stimulated to provide more knowledge to the local energy cooperatives, instead of the every local energy cooperative reinventing the wheel. The conception phase of the process design offers room for alignment of the objectives between the two parties. In short, for the applicability of this research, the focus within the municipality should be on supporting the niche, the project of the local energy cooperative, developing the same objectives, and iterating the process design over time.

Type of local energy cooperative

In this research, a wind cooperative and two advice cooperatives are studied. The developed process design applies to the general aspects of these cooperatives. However, during the case studies, the BWW mentioned the difficulties that arise by the project development of a windmill. These difficulties are specific to wind cooperative and do not apply to advice cooperatives. Iterations regarding specific types of local energy cooperatives can increase the applicability of the process design.

Incentives in the energy transition

During the case studies and verification interviews, it became clear that sharing vision development and learning from past experiences of both parties are important aspects for establishing a sustainable collaboration between municipalities and local energy cooperatives. This results in the context of the studies regarding Strategic Niche Management and Transition Management (Falcone 2018; Kemp, Schot, et al. 2007). In case a municipality is not open to the experience of the local energy cooperative, it is hard to collaborate. Therefore, there has to be an incentive to stimulate the energy transition upfront. The Climate Agreement ('het Klimaat Akkoord') stimulates the municipalities to put effort in realising a local energy transition. However, the increase in municipal tasks combined with limited human and financial resources may decrease this incentive. By collaborating with local energy cooperatives, the municipality can gain more human resources to realise their energy transition objectives. The process design of this study clarifies the process and therefore, prevents the municipality from spending resources in reinventing the wheel.

Besides the municipality, the local energy cooperative has to have incentive as well to join the process design regarding the energy transition. During the interviews, it became clear that citizens are not aware of the governmental procedures regarding the energy transition. Besides, the local energy cooperatives largely depend on volunteers. The process design clarifies the activities for communication and collaboration with the municipality. To enlarge the incentive of the local energy cooperatives to join the process design regarding the energy transition, the example of the municipality of Amsterdam can be added to the process design. This example was provided by EnergieSamen during the verification interviews. Within the municipality of Amsterdam, local energy cooperative may receive a subsidy by fulfilling a stage of project development. For the last phase of the project, a loan instead of a subsidy is provided to stimulate the independence of the local energy cooperative. The granted financial resources stimulate the local energy cooperatives to contribute to collaborate with the municipality and contribute to the energy transition.

Conclusions

Research question

Limitations

Recommendations



In this chapter, the answer to the stated research question is provided. First, the sub-questions are answered and these are followed by the answer to the main question. After that, the limitations of this research are discussed, recommendations for further research are provided and implications for practice are addressed.

7.1 RESEARCH QUESTION

1. What are the characteristics of a collaboration between municipalities and local energy cooperatives?

Several aspects are influencing the collaboration between municipalities and local energy cooperatives for contributing to the energy transition: local embeddedness, general aspects of collaboration, and the components of governance arrangements.

First of all, the aspect of local embeddedness. In this research, local energy cooperatives are community-focused initiatives that are founded by citizens. For this type of local energy cooperatives, local embeddedness and support from the municipality are highly important to realise their objectives. Collaboration regarding the energy transition asks for a relationship where local energy cooperatives can participate in realising an energy transition instead of solely being a consumer of the provided energy. For this collaboration, the municipality needs to involve local energy cooperatives in an early stage of their decisions regarding the energy transition and both parties need to share their knowledge about this transition.

Secondly, the collaboration between the municipalities and the local energy cooperatives is influenced by the general aspects of collaboration: the past, the desired future, negotiation, trust, implementation, and agreement. Over time, these aspects evolve during the stages of project development; conception stage, feasibility stage, planning stage, and operation stage.

Lastly, governance arrangements facilitate the collaboration between governments and citizens. Within these arrangements, the instruments, processes, and networks are aligned between the involved actors. An enabling mode of governance in these arrangements is beneficial for the support of local energy cooperatives and the collaboration between the two parties. Subsequently, this enabling mode of governance corresponds to the role of the municipality as an intermediary. An intermediary role of the municipality within the governance arrangement can be advantageous for the use of its network and expertise. By a facilitating role of the municipality the local energy cooperatives can be supported in realising their objectives.

In addition, for the implementation in practice, insights from perspectives on transition are beneficial. Within the transition perspectives of Strategic Niche Management and Transition Management, collaboration, developing shared objectives, and knowledge sharing are central in learning from small niches or transition arenas. The projects of the local energy cooperatives represent the niches or arenas.

2. How to capture and apply the aspects of collaboration between municipalities and local energy cooperatives?

For capturing and applying insights about the collaboration between municipalities and local energy cooperatives, the Double Diamond method is applied. The method is divided into two diamonds. Both diamonds are based on the concepts of divergent and convergent thinking, which stimulates to deepen the problem and to create ideas by studying other areas and sectors.

The first diamond is focussed on capturing the collaboration between municipalities and local energy cooperatives by executing a literature study and empirical research. The empirical research consists of

semi-structured interviews and a cross-case analysis. By comparing the theory and practice, the actual problem is deepened and defined.

The second diamond focusses on the application of the insights from the first diamond. For divergent thinking, other areas and sectors are studied to gain new insights for the construction of the collaboration between the municipalities and the local energy cooperatives. All the captured insights are applied in a final design, which is validated by participants in an online survey.

3. What insights in the collaboration between municipalities and local energy cooperatives need to be applied in a design?

There are three barriers for collaboration identified: (1) attitude of the municipality, (2) group dynamics and composition of the local energy cooperative, and (3) ignorance.

First of all, the attitude of the municipality seems to be caused by the need to be transparent as a government, the potentially conflicting visions of the several departments within the municipality, and the limited financial and human resources of the municipality. Over the last couple of years, the national governments assigned more tasks to the municipalities. However, the financial and human resources did not increase by the same extent. Therefore, the municipality is not able to draw the same attention to all the assigned tasks, and the energy transition is not always a task that has priority over the other tasks. To be able to collaborate with local energy cooperatives and stimulate the energy transition, the municipality has to compose an internal procedure and map all their activities and roles to establish local energy projects.

Secondly, the group dynamics and group composition of the local energy cooperative can be decisive in becoming a professional and independent organisation. However, due to a lack of knowledge, citizens do not know what to expect of the process when joining a local energy cooperative. Therefore, it is hard to attract citizens to join a new local energy cooperative. Especially citizens who have expertise in the juridical or financial domain. Experts in the juridical and financial domain are needed to establish a professional organisation. Case study results show that from the moment a local energy cooperative is past the feasibility and planning stage, citizens are more willing to join because the result becomes more certain. This can be stimulated by knowledge sharing about the energy transition and local energy cooperatives.

Thirdly, ignorance is one of the reasons for citizens to postpone joining a local energy cooperative. On beforehand it is not clear what citizens can expect from the process. The municipality does not provide an overarching procedure in which all necessary activities are mapped. Besides, citizens and municipalities are not used to collaborate to realise energy transition objectives. The case study and verification interviews show that a design of the process for both parties can deduct the level of uncertainty about the process and increase the amount of trust and awareness between the two parties. Therefore, collaboration and communication during the process of project development need to be clarified.

The literature study and case studies learn as well that an enabling mode of governing and a facilitating intermediary role by the municipality have a positive influence on the collaboration between the municipalities and the local energy cooperatives. Besides, according to the perspectives of Strategic Niche Management and Transition Management, focussing on collaboration, knowledge sharing, and evaluation within the projects of the local energy cooperatives are needed to realise a transition.

4. How can the insights be incorporated in a design and validated to facilitate the collaboration between municipalities and local energy cooperatives?

For the incorporation of the insights into a design and the validation of the design three purposes have been composed: (1) the internal organisation of both parties, (2) knowledge sharing about the energy transition and local energy cooperatives, and (3) clarifying the collaboration and communication during the process of project development.

According to the Double Diamond method, other areas and sectors are studied to learn about their approach. The focus for studying the other areas and sectors is the relationship between municipalities and citizens. Reviewing these other areas and sectors, an overarching process design can clarify the processes of both parties for collaboration. By composing a process design, activities for realising an energy transition project are mapped. Besides, the processes of both the municipality and the local energy cooperative are mapped for their internal organisation before collaborating. Using the concept of a swimming lane diagram offers opportunities for visualising the interconnectedness of the activities that have to be executed by both parties. This offers opportunities for knowledge sharing about the energy transition and local energy cooperatives. The activities are divided into five stages of project development. Each stage has to be completed before entering the following stage, this could imply several iteration processes before accomplishing a project stage. Hence, within every stage, the parties have to discuss their activities to avoid miscommunication and conflicts. During the operation stage, both parties have to evaluate the executed process and the process design has to be updated.

The process design is validated by the participants of the case studies and verification interviews and was executed via an online survey. The validation by these participants has provided the opportunity to validate the design from both the perspectives of the municipalities and the local energy cooperatives.

Main research question: How can municipalities and local energy cooperatives improve their collaboration to facilitate the energy transition?

In the literature, three barriers for the collaboration between municipalities and local energy cooperatives have been identified: (1) the attitude of the municipality, (2) group dynamics and group composition of the local energy cooperative, and (3) ignorance. For overcoming these barriers and stimulating the collaboration between municipalities and local energy cooperatives, a process design is developed. An overview of the final process design is shown in Figure 7.1. This process clarifies the individual process of a party and gives insights into the overall process of collaboration between the municipality and the local energy cooperative. Each stage in the process can be considered as a prerequisite for entering the following stage.

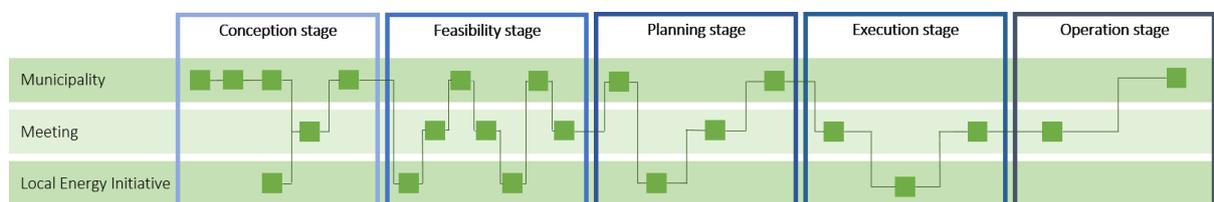


Figure 7.1 Overview of the final process design

Application of the process design by the municipality requires the municipality to internally organise a procedure for this type of collaboration. Besides, it stimulates the municipality to be transparent about the procedure and possibilities to stimulate the energy transition. Before starting the process, the local energy cooperatives are informed about the expectations and roles of the municipality. Therefore, they are aware of the demanded expertise during the process. The outcomes of the process design result in overcoming the barriers in the collaboration between municipalities and local energy cooperatives. By the establishment of a sustainable collaboration between these parties, the energy transition can be stimulated.

7.2 LIMITATIONS OF THE RESEARCH

While the research question of this study is answered, there are limitations to this research. These limitations could offer possibilities for further research on this topic:

1. **Number of cases:** For this research, three cases in the three largest cities in the province of North-Brabant have been studied, which is a relatively small sample for generalising insights. Differences in the size or geographical location may offer new insights. Besides, the validation is executed by the representatives of these cases as well. Therefore, the validation may not cover all the iterations that are needed for delivering a process design that applies to all sizes and location of local energy cooperative projects.
2. **Roles of the municipality:** For the cases, only the officers in the department responsible for the energy transition or sustainability within the municipality were interviewed. During the case studies and verification interviews, the different roles and perspectives within the municipality became clear. By interviewing one perspective, other perspectives regarding the energy transition might be underexposed in the final process design.
3. **Informal contact:** In the collaboration between the municipality and the local energy cooperative, the vast majority of the contact is informal and not recorded. Therefore, it is hard to verify the statements by the interviewees. By interviewing both actors of the collaboration, it is attempted to abstract the truth. However, there might be a risk of a distorted representation of the facts.
4. **Involved actors:** The focus of this research is the collaboration between municipalities and local energy cooperatives. However, more actors are involved in realising an energy transition, such as energy companies and network operators. These actors as well could influence the realisation of the objectives of the municipality and the local energy cooperatives.
5. **Research participants:** The participants of the case study interviews are similar to the participants for the validation of the process design via the online survey. Therefore, during the validation, the participants were able to reflect on their perspective relative to the other perspectives that are included in the process design. However, there might be a risk of a certain bias while joining the online survey, which does not lead to new insights during the validation.

7.3 RECOMMENDATIONS FOR FURTHER RESEARCH

Outcomes and limitations of this research imply recommendations for further research:

1. **Iterations and validations:** The research examines three similar sizes cases in North-Brabant, more cases could strengthen the process design. More iterations and validations of the process design may improve the process design and its validity.
2. **Types of cooperatives:** For this research, one wind cooperative and two advice cooperatives are studied. During the case studies, it was mentioned that the differences between these cooperatives may result in different activities that have to be executed. For the development

of a process design which applies to specific types of local energy cooperatives, future research into these types of local energy cooperatives could improve the process.

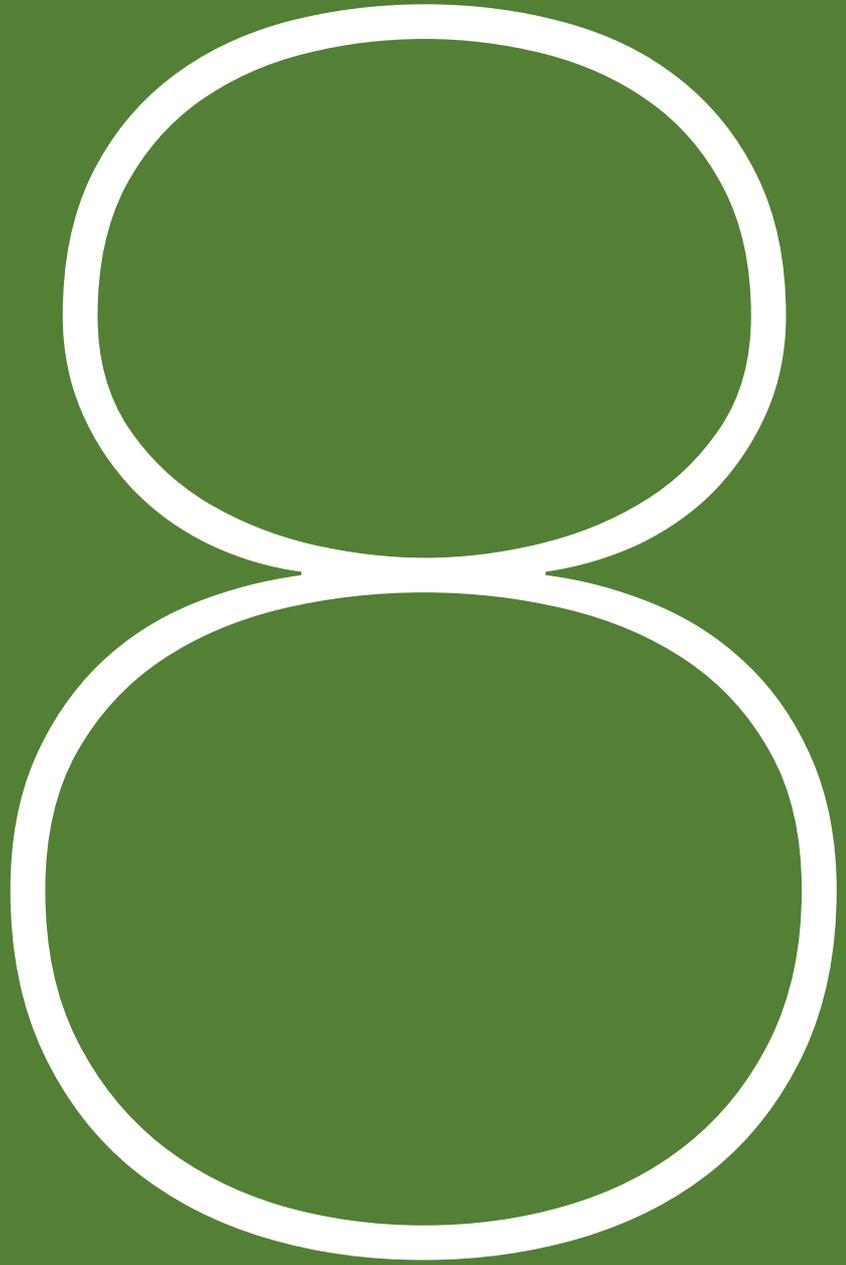
3. **Internal procedure:** The conception stage of the process design is partly dedicated to establishing an internal procedure in the municipality. This may be harder than assumed. Further research on how to create this procedure and how to inform the local energy cooperatives about this procedure could strengthen the other stages of the process design.
4. **Stages of research:** The validated process design incorporates all the stages of project development. It might be interesting to study one of these stages into detail. Further research in these stages could reveal more aspects that have to be taken into account in the collaboration between municipalities and local energy cooperatives.
5. **Other process design:** By validating and iterating this process design, this process design can be a basis for other process design in the collaboration between governments and citizens.

7.4 IMPLICATIONS FOR PRACTICE

Besides recommendations for further research, there are recommendations for municipalities willing to collaborate with local energy cooperatives and stimulate the energy transition:

1. **Focus per stage:** For the implementation in practice, all the activities of a stage have to be executed before entering the following stage. Feedback loops within stages may be necessary for fulfilling the activities of the stages to a required level. This required level should be assessed by the municipality. By assessing the progress of the project per stage, both parties can work with documents and information of a required level that is needed for the execution.
2. **Attract citizens:** Citizens seem to be willing to join the energy transition and generate renewable energy, which is beneficial to the objectives of the municipality. The process design provides an overview of the process for energy project development, therefore interested citizens can estimate what to expect during this process. By distributing the process design and requirements for collaboration, more citizens may be willing to join the energy transition process.
3. **Treat as a partner:** From the moment the local energy cooperative is becoming a professional party, the municipality has to acknowledge that the cooperative is a partner for the energy transition. By collaborating instead of counteracting, the objectives of both parties regarding the energy transition can be realised.
4. **Share knowledge:** Existing local energy cooperatives are establishing knowledge platforms for sharing information about the energy transition and local energy cooperatives. The interpretation of the activities in the process design could benefit from this existing knowledge. Besides, by sharing knowledge about the municipal procedures regarding the energy transition could complement the process design.
5. **Internal procedure:** The projects of local energy cooperatives address several departments within the municipality. By establishing a procedure in which the objectives and requirements for all these departments are definite, the municipality and the local energy cooperatives can establish a project regarding the energy transition.

Reflection



Sustainability and the relation between public and private always had my interest. I assumed that it might be useful for my thesis to have a topic that will keep me curious. Therefore, the topic of municipalities collaborating with citizens within the energy transition immediately aroused my interest. I was lucky, before I knew, three enthusiastic professors were willing to guide me during my thesis and a Brink Management/Advies was interested in my topic as well.

This graduation research was the first full research of multiple months that I have conducted. Every step in the process had its struggles and opportunities. I enjoy learning, reading, and writing. However, after weeks of reading, sometimes it was hard to keep motivated and keep looking for new information. Besides that, sometimes I had a hard time to explain all the things I learned and to write it down clearly. I was surprised by the joy I felt during and after the interviews where all the interviewees were enthusiastically telling about their activities. During the research, I became more familiar with the topic and the process of graduation, which resulted in more substantive conversations and new insights and this contributed to my enthusiasm.

It was told on beforehand: 'Your graduation process will not only be academic research but a personal research as well.' How obvious as it may sound, it is true. During this thesis, I learned a lot, not only in an academic way but also in a personal way. The COVID-19 pandemic should not be an excuse, however, it enlarged my flaws. Studying in my bedroom by myself raised the threshold of asking for help and some days it was hard keeping my motivation high. However, it triggered my creativity in finding ways to keep myself motivated and I was forced to ask for help. A meeting with my supervisor Daan Schraven, in the middle of writing my thesis, emphasized that to me. We talked about ownership of the project while I felt lost in my project and I did not know how to proceed. However, after talking about my struggles, I regained my enthusiasm for the project and took back the control. This is an example of one of the things I learned, the real definition of independence. It is not about doing all things by yourself and not asking for help or support. Real independence is knowing your flaws and limitations and asking for help when needed. Real independence is telling about your personal life if it is affecting your work.

Another thing I learned is that working in a team suits me better than working on full research myself. During the master of Construction, Management, and Engineering I experienced the satisfaction of brainstorming, learning new skills from others, and collaborating. During the graduation process, there were lonely times as well. Times where I got stuck in my head and was not sure about my project. Brainstorming with other people helped me out. If it was really up to me, I had not shown my thesis until the moment of graduation. I did not want to bother other people with documents which were not perfect or fully finished. Sometimes forced by other people, I experienced the benefit of showing interim updates of my thesis document. Even after multiple times of reading and adjusting, I am still aware of possible improvements. However, handing in my thesis makes me feel proud of myself. Despite all the highs and lows during the process, I managed to deliver a scientific thesis. Graduating was not always easy for me, but I've learned from it and would not have missed it.

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