Standardization of the development of local energy initiatives

Bachelor Thesis Report Civil Engineering

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energie samen buurtwarmte

The figure on the frontpage is obtained from (Provincie Groningen, 2016)

Preface

This report was written as part of my bachelor Civil engineering at the university of Twente. In this research, literature was studied, and expert opinion was sought on the topic of the standardization of the development of local energy initiatives.

I would like to thank all that helped me within the period in which I conducted this research. A very special thanks goes out to Gerwin Verschuur, who not only provided his network and his time in the weekends to allow me to conduct my research, but also provided me with a lot of insight into the energy transition and the interaction with other experts. I would also like to thank Karina Vink, who guided me throughout the process of this research with feedback on my proposal and this report. I would also like to thank all experts who took the time to share some of their knowledge on the topic with me. Lastly I would like to thank my family and especially my sister for helping me during my study time and taking the time to proofread my writing.

I hope you enjoy reading this report as much as how I enjoyed creating it. For any questions, feel free to contact me through:

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Abstract

The Netherlands is currently working to eliminate the use of natural gas within the urban environment. From the Climate accord, the intention is to do this via a neighbourhood-based approach, which opens the door for local ownership and local energy initiatives. The development of such a local energy initiative is still only loosely documented, with no clear standard process to follow. This unknown path is not helped by the recent changes to how the municipality is involved in the heat transition, namely their new responsibilities from the climate accord and Heat act 2.0, which in general give them more influence over the process and products of the heat transition. This means the role division and cooperation between municipalities and local energy initiatives has become a point of interest.

This leads to this research. The objective of this research is to gain further insight in the standardization of the development of initiatives with specific attention to the role division between the municipality and the local energy initiative. To fulfil the research objective, two main questions were to be answered: 1) How far developed does a local energy transition initiative need to be in order to start the project development process? And 2) What are the options for the role division in the energy transition in the built environment for energy initiatives and municipalities? To answer these questions a panel discussion, interviews and written responses were used to obtain information from municipal and initiative experts, which was used in addition to (grey) literature on the topic. Four interviews were held on the role division and one panel discussion was held on the initiative development.

To answer the first research question, based on an existing framework a list of requirements for an initiative to start the plan development were created. The main method that was used to gain the information to do so was gained from a panel discussion on the criteria used to create the requirements. From the analysis of this panel discussion and new insight from the research team, the new requirements were created. From this panel discussion, it also became clear that the practical realisation of such a project is much more complex than you would be able to represent in such a framework, however a framework could provide some guidance within the development.

In regard to the second research question, possible roles were found in literature for both the local energy initiatives and the municipality. Many roles found in literature were based on the participation ladder. These literature views on the roles were confirmed and expanded on during the interviews with initiative members and municipal staff, where professionality and legitimacy were indicated as important factors in the municipal cooperation with initiatives. The roles found also provided clear areas of conflict and possible cooperation depending on the position taken by the initiatives and municipality.

To conclude, this research found insight into the standardization of the development of local energy initiatives in the form of a list of criteria and requirements for an initiative starting the plan development phase and insight into the municipality-initiative role division.

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1. Introduction

1.1 Context

In 2015, all member states of the UN recognised a need for action due to the worldwide effects of climate change and came to an agreement to combat climate change with as goal to aim for a maximum 2° Celsius increase compared to pre-industrial levels (United Nations, 2015). Based on this agreement, the Dutch government developed their own plan to play their part in reaching that goal. This plan had as aim to reduce the CO2 emission by 49% in 2030 and 95% by 2050 compared to 1990 (Rijksoverheid, 2019). The plan covers many different sectors, including the built environment.

The actions planned in the sector of the built environment focus on moving away from using natural gas for heating homes. An estimate of the CBS is that in 2019 89.5% of all Dutch homes still used a natural gas fuelled cv system to heat their homes (CBS, 2021), showing a clear need for such a transition. This transition would be done via a neighbourhood-based approach, in which inhabitants, homeowners, and (local) governments are heavily involved in the process of developing an energy transition plan for each neighbourhood. The general idea is that this approach should create locally supported solutions and allow for fast scalability and lower costs. the Dutch government has also created a learning program “Programma Aardgasvrije Wijken” (PAW). This program is used to gather knowledge about possible approaches and solutions for the energy transition and provide subsidy for municipalities that are working with neighbourhoods that are working on the heat transition. This is done to stimulate more municipalities to develop such plans with their inhabitants.

However, the Planbureau voor de Leefomgeving (PBL), a Dutch research institute in the area of nature, environment and spatial use, recently conducted a study into how a set of exemplary projects were performing, what issues they ran into and what lessons could be learned from this (Dignum, et al., 2021). In this research, they found that more customization than initially expected was necessary for the development of the energy transition plans for the different neighbourhoods. This higher level of customization in the transition plans increases the difficulty for scaling those plans up to a national scale, meaning there is currently no standard way of developing such energy transition plans. Some of the PAW neighbourhoods included in the study were local energy initiatives run by inhabitants meaning that the lack of standardization of the creation of energy transition solutions also seems to apply on those neighbourhoods and in extension on the involvement and internal development of initiatives. This lack of standard development path is also recognised by Buurtwarmte. (Verschuur, Interview Establishing thesis assignment, 2021)

Another issue identified in the PBL study was with the role of municipalities within these projects. The municipalities were trying to facilitate the process while still needing to balance their other activities and carrying a lot of responsibility to succeed in the energy transition (Dignum, et al., 2021). The municipal respondents within the research also stated a lack of capacity, knowledge and necessary internal cooperation to handle the developments (Dignum, et al., 2021). This issue was also recognised by the municipality of Zwolle, who requested Buurtwarmte to cooperate with Drift, a research institute from Rotterdam, to create a learning community in which experiments can take place on the role of the municipalities and cooperation with local energy initiatives between a number of local initiatives and the municipality itself (van der Have & Schipper, 2021).

1.2 Problem description

Two issues can be identified from Section 1.1, namely 1) the lack of a standard path of development for local energy initiatives and 2) the lack of knowledge on the role of the municipality within the energy transition in relation to local energy initiatives.

1) In regard to the lack of a standard development path for local energy initiatives, Buurtwarmte, a national support organisation for local energy initiatives, has started the development of such a standard method for energy initiatives ran by local inhabitants. The main area of development that is under current focus is a metric, consisting of criteria and different levels of requirements, which can be used to measure how far developed an initiative is. However, this metric currently is unverified. Buurtwarmte requested that as part of this research this verification is conducted to further their development of the standard method, referred to by Buurtwarmte as "Het Buurtproces", or within this study: Initiative development process.
2) The role the municipality can take in the energy transition varies among many sources, especially due to the expectations created by the Climate accord, and the different views among the municipalities. Buurtwarmte therefore requested a study to investigate the different views on the role municipalities take and how that impacts initiatives.

1.3 Research objective and questions

The objective of this research is to contribute to the standardization of the "Buurtprocess" of Buurtwarmte with a focus on the cooperation of local energy initiatives and municipalities in order to make the development of initiatives more manageable. This is done by finding expert consensus on elements of the existing development framework of Buurtwarmte and by gaining insight in the experiences of existing local energy initiatives.

Based on that research objective, two main research questions have been developed. The first focusses on the validation of the framework used by Buurtwarmte for the development of an energy initiative. The second question focusses on a specific element in that framework, namely the role division between municipalities and local energy initiatives. This role division plays an important role in the development of local energy initiatives due to the overlap in activities of the municipality in the creation of the energy transition plans and initiatives with their own idea how to handle the energy transition.

1) How far developed does a local energy transition initiative need to be in order to start the project development process?

From this main research question, two sub questions have been defined. The first question aims to obtain knowledge about the set of criteria defined in the final step of the framework that are used within the entire process, while the second question aims to identify the criteria and requirements relevant for the realisation milestone of the process.

- *Are the criteria used within the Buurtwarmte initiative development framework accurate, understandable for all parties, complete and non-redundant?*
- *What are the requirements in the category of stakeholder cooperation that an energy initiative needs to meet in order to start the project development phase?*

The development framework's criteria have to be validated in order to be used in the second step of this research. One specific criterium is the role division between an energy initiative and the municipality. The view of Buurtwarmte is that the role division needs to be clearly

determined before the start of the development phase. There are different options for cooperation from which can be chosen.

2) **What are the options for the role division in the energy transition in the built environment for energy initiatives and municipalities?**

From this main question, two sub-questions have been identified. These two questions each define the main research question from the perspective of one of the two parties involved, with as goal to both get an inventory of possible roles and obtain insight into the potential impact of those roles.

- *What roles can the municipality take in the development phase and what does that mean for the potential role of local initiatives?*
- *What roles can a local energy initiative take in the development phase and what does that mean for the potential role of the municipality?*

1.4 Scope

This research focusses on the elimination of natural gas within the built environment using local energy initiatives as part of the energy transition with a particular focus on the project development phase as defined by Buurtwarmte within its development method (Buurtwarmte, 2021). There are a number of reasons for this limitation to the scope.

The first is that Energie Samen, the parent organisation of Buurtwarmte, sees itself as the national support- and interest group for local energy initiatives and companies (Energie Samen, 2021). This means their main interest is gaining and refining information that would help them in their mission to help and develop local energy initiatives as part of the energy transition.

Secondly, Buurtwarmte itself only works with initiatives within heat transition, a limited area of energy transition. Therefore, the information most interesting for Buurtwarmte would be related to that section of the energy transition in relation to local energy initiatives. The use of the term energy transition, that often encompasses the elimination of non-renewable energy sources within the energy sector (which includes the heating of houses), is for that reason also limited to the elimination of the use of natural gas to provide heat and heated water for objects within the built environment within this research.

Lastly most local energy initiatives that are currently developing as a response to the Climate Accord are either in the initiation phase or in the project development phase, meaning information about the project development phase is somewhat available and highly relevant for initiatives currently starting. Therefor the study focusses on the end of the initiation phase of the requirements.

2. Theoretical background

Within this chapter, the theoretical background elements that are important to this research are presented. This includes the legal and political background in which municipalities and local energy initiative need to operate for the heat transition, the view of how citizens can be involved in governmental decision making on the energy transition plans and lastly a detailed description of the existing initiative development method of Buurtwarmte.

2.1 Climate act, Climate Accord, Heat Act and Heat Act 2.0

There are four main legal documents relevant for this research. The first document is the Climate act in which the Dutch Government stated the three CO2 reduction goals, namely a relative reduction in CO2 emissions compared 1990 of 25% by 2020, 49% by 2030 and 95% by 2050 (Rijksoverheid, 2021).

This was done to meet the international climate agreement of limiting the global temperature rise to 2 degrees. (United Nations, 2015).

In order to meet the 49% goal by 2030, the Dutch government, together with a number of partners, developed the Climate Accord in which the measures and methods to reach that goal were described (Rijksoverheid, 2019). Part of this reduction is to be achieved by the elimination of the use of natural gas in heating of homes. Municipalities have been made responsible for the development of the plans to achieve this transition from fossil fuels to renewable sources. The transition plan development process should be neighbourhood-based, involving local inhabitants and building owners. Each municipality also has to work with other municipalities in the region to develop a Regional Energy Strategy (RES) in which regional agreements for renewable energy are made. This includes an overview of possible renewable heat sources, which can be used to determine how much potential heat is present within the area and add to the national data on renewable heat sources.

The second document relevant to the energy transition within the built environment is the Heat act. This is the currently active legal guideline that dictates the way heat suppliers operate. It includes rules about maximum prices, licensing, guaranteed supply and many other aspects of operating a heat network (Rijksoverheid, 2021). As a response to the fact that the Heat act only works as consumer protection, its replacement, the Law Collective Heat Provision, is being developed. (Ministery of Economic affairs and Climate, 2020)

The last legal document relevant for this research is the Heat Act 2.0 or also known as the law Collective Heat Provision. It is planned to be implemented by the 1st of January 2022 and will fully replace the existing Heat Act as the legal guideline for heat provision. The new law is meant to better match the new neighbourhood-based approach for the energy transition plans better compared to the existing Heat law (Ministery of Economic affairs and Climate, 2020). The new law should provide more space for collective heating solutions, enforce CO2 reductions from the heating companies and places the responsibility of creating plots and assigning heating companies to those plots to the municipality, in order to match the transition plans developed by those same municipalities (Ministery of Economic affairs and Climate, 2020). Regardless of these additions, it should provide similar consumer protection as the existing law.

In August 2020 the consultation period for this act was finished and influential organisations related to the energy transition gave their reactions to it, such as the Vereniging van Nederlandse Gemeenten (VNG), Interprovinciaal Overleg (IPO), Unie van Waterschappen, Energie Samen, warmte coalitie and academics. These responses were often critical of the exact terms used to describe the heat companies that were to be assigned to the plots and the impact of this description on the development of smaller scale and diverse solutions, including locally owned networks or companies (Warmte Coalitie, 2021), (Energie Samen, 2021), (Vereniging van Nederlandse Gemeente, Unie Van Waterschappen, & Interprovinciaal Overleg, 2021), (Huygen, Akerboom, & Lavrijssen, 2020). It is currently not yet known what changes are planned to be made to the current version of the new law to represent the changes advised by these organisations.

To conclude, these four documents contain the legal responsibilities of municipalities within the heat transition, including a clear indication of which role the municipalities must play and also the legal and political climate in which the initiatives develop.

2.2 Participation

Energy initiatives are a way in which citizens to take a position within the development of the energy transition and take control over their heat provision. This can be seen as a form of participation of inhabitants into governmental decision making. Therefor for this research it is important to define participation and the definition that will be used for participation is from Reed (2008): "participation is defined as a process where individuals, groups and organisations choose to take an active role in making decisions that affect them". The choice was made to use this definition as it accurately matches the view from the Climate Accord of how non-governmental organisations are involved within the energy transition. A common way of viewing participation is that it can be seen as consisting of different levels.

These levels were first defined by Arnstein (1969) in her paper "*A ladder of citizen participation".* Within this paper she defined eight levels of participation split into three categories, ranging from government-controlled decision making with no influence from citizen stakeholders (Non-participation) to citizen being in full control (Citizen power).

A version of Arnsteins participation ladder limited to five levels was developed by Mostert (2003). He defines citizen participation in five levels, namely: *Information, Consultation, Discussion, Co-decision making and Decision making*. These are in order of the amount of influence public stakeholders have on the decision making from none to complete power. *Table 1* on *page* 9 shows a more detailed description of each level of participation.

Table 1: Public Participation methods and their descriptions (Mostert, 2003)

Level of participation	**Description**
Information	The public gets/has access to information
Consultation	The views of the public are sought
Discussion	Real interaction takes place between public and government
Co decision making	The public shares decision-making powers with government
Decision-making	The Public performs public tasks independently

Including public participation in decision making is not without its effects. Mostert (2003) also defined a list of potential benefits and potential problems. This list can be seen in Table 2 on page 9.

Table 2: Potential benefits and potential problems of public particiaption (Adapted from Mostert, 2003)

Potential benefits	Potential problems
Better informed and more creative decision making Greater acceptance of decisions, fewer implementation problems Social learning of all involved More open and "Integrated" government Enhanced democracy	Reluctant Government that gives no serious follow-up resulting in disappointment and less public acceptance of decisions Limited and unrepresentative response Low quality responses Inconsistent decision making Higher costs and time

The potential benefits and problems are very relevant, especially the benefit of possible greater acceptance of the decisions due to recent pushback from inhabitants to energy transition plans, such

as in Amsterdam against windmills on land and in de Bilt against a specific solar park. (Kruijff, 2021), (ANP, 2021)

2.3 Buurtwarmte development framework

Buurtwarmte is in the process of developing a standard method to develop local energy initiatives into well organised, financed and plan-based organisations provide an essential service to an area. Buurtwarmte refers to this initiative development method as “Buurt proces”, or the neighbourhood process (Verschuur, Meeting 16-04, 2020). Within this research, the term initiative development process will be used to refer to that standard method.

For practical purposes, within this research the term initiative or energy transition initiative will be used to refer to any group of local inhabitants that take part in the heat transition. These initiatives can have a large diversity of goals regarding the energy transition. An initiative can be little involved, only aiming to raise awareness among the people in the neighbourhood, or have higher levels of involvement, for example actively taking part in the process to create the transition plans. The highest level of involvement Buurtwarmte considers is becoming a so called “Warmteschap”, where the inhabitants and other local organisations become owner of an entity that provides heat to the local inhabitants, therefore become an essential part of the solution (Buurtwarmte, 2020).

The initiative development process uses four phases. These are: Initiation (Initiatie), Development (Ontwikkeling), Realisation (Realisatie) and Exploitation (Exploitatie). Each of these phases have been divided into 3 steps. A visualization of this can be seen in Figure 1 on page 10. Each phase will be described shortly below. During the entire process, the actions focus on each of the four areas of development as defined by Buurtwarmte, which can be seen in Figure 2 on page 11. These four areas of development are also used to organise the knowledge Buurtwarmte gathers and refines for developing initiatives.

Figure 1: Steps and phases in the development process of Buurtwarmte (Buurtwarmte, 2021)

Figure 2: The four areas of development of an initiative (Buurtwarmte, 2021)

Initiation phase (Step 1-3): The initiation phase of the initiative development process is used to create a solid basis for the initiative. This includes creating a plan of approach for the entire development process, exploring the different options and visions and finding neighbourhood support for the initiative and finally creating a document discussing the planned solutions to be implemented within the neighbourhood, rough ideas for the financial management, board members and communication plans with the residents. This phase should create sufficient information to start the next phase, which involves creating detailed plans and a planning for realizing the solution as found within this phase.

Development phase (Step 4-6): During the development phase the rough ideas from the initiation phase get turned into a full design for the neighbourhood, which also includes the financial budget for running the system on the long term. This phase should produce a viable design with financing lined up.

Realisation phase (Step 7-9): During this phase of the development of the initiative, the construction is actually started and the plans from the previous phase are realised. The final product of this phase is the systems being present and functioning for all residents taking part in it.

Exploitation phase (Step 10-12): The exploitation phase involves the long-term running of the initiative. This involves the development of maintenance plans for the equipment, making of any improvements or expansions of the system and any other actions needed for the initiative to serve its customers, namely the residents.

Measuring an initiative's development

To measure an initiative's development, Buurtwarmte has cooperated with a few experts from financing and network partners and developed a set of criteria and requirements that apply to the initiative when it reaches the 7th step, as indicated in Figure 1 on page 10. If an initiative meets these requirements, it should be ready to start the realisation of their plans. For each step up until the 7th step, the relevant criteria and matching requirement have to be selected and set, in order to determine if an initiative is ready to continue to the next step in its development.

The setting of the criteria and requirements is not yet settled. They were developed with the involvement of a smaller group of experts. When these criteria and requirements were discussed with other experts of Buurtwarmte, discussions arose about the requirements at the different steps, indicating the need for these to be investigated further. The criteria and the requirements were

therefore included within this research, along with the general standardization plans of Buurtwarmte.

3. Methodology

To find the data and information on the standardization of the development of initiatives, three different methods were applied. Figure 3 shows the structure of the research, which contains the information sources and methods to answer the reserarch questions and fullfill the research objective. The cylindrical boxes indicate the main research questions. The research team making many of the decisions consists of my company supervisor Gerwin verschuur and myself.

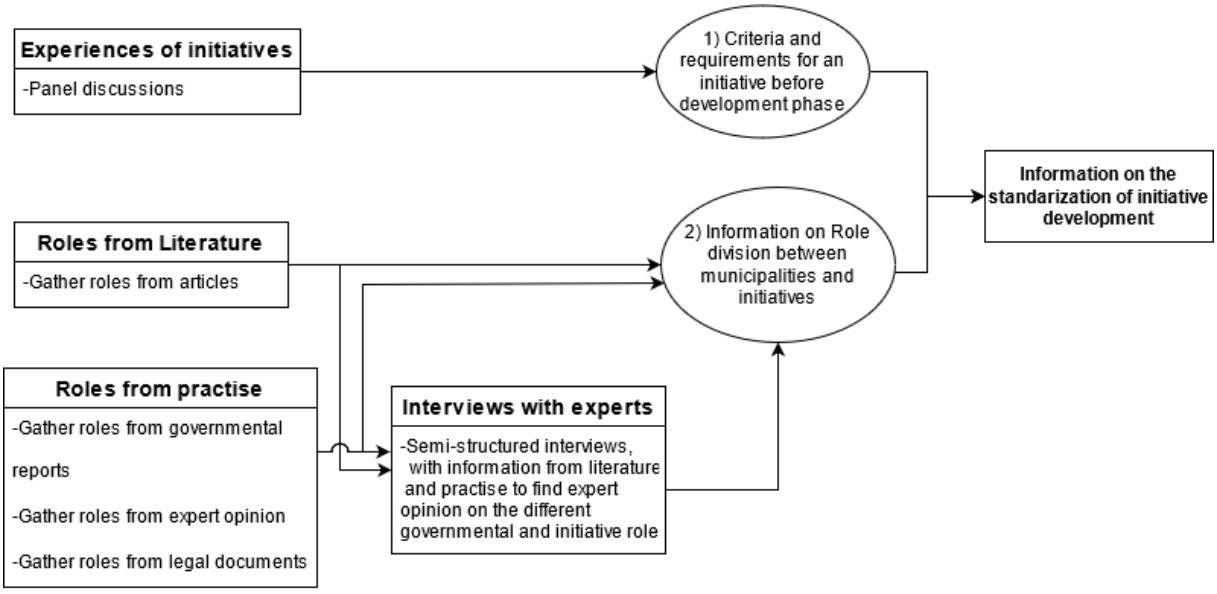

Figure 3: Research Structure

In order to get a better understanding of the development of local energy initiatives and improve the quality of the criteria and requirements for an initiative before the development phase, expert opinion was sought within the network of Buurtwarmte. The goal was to expand and check the existing development framework using knowledge of the partners of Buurtwarmte. For this, the criteria list was first translated and sent to EBO consult, a Danish district heating developer, to see if, based on their experience in the development of district heating, any topics were missing. After this, a panel discussion was organised with the leading initiatives within Buurtwarmte, where other than the completeness, also the organisation and clarity of the criteria was discussed. The leading initiatives are the initiatives with the most knowledge about how to develop initiatives as they are the furthest in the development. Based on the feedback from EBO consult and the information gained from the panel discussion and additional detailed remarks, the criteria and requirements at step 3 were adjusted. Sadly, due to a lack of time, it was not possible to organise a panel discussion with experts specifically for the requirements at the third step, nor was it possible to organise a panel discussion with a broader group of experts. The adjusted version of the requirements and criteria was again shared with the Buurtwarmte network, however any responses to it fall outside of the scope of this research due to a lack of time.

To get a general overview of which roles were available for municipalities and local energy initiative, a literature study was performed. For this literature study, grey literature, such as governmental reports were included due to the viewpoint that a lot of the knowledge on this topic would lie within practise. To find the literature for the municipal roles, the search terms: “Governmental role energy

transition", "municipal role energy transition" and its Dutch equivalents were used in Google (Mainly for the grey literature), Google Scholar and Research gate. Some of literature was also provided by Buurtwarmte and some documents were provided by the interviewees as background material, that was later included within the results. To find the literature on the role of energy initiatives a similar search was conducted with the search terms: "role energy initiatives", "citizen initiatives in the energy transition" or the Dutch equivalents.

To supplement the literature and gain more insight from practise on the roles of municipalities and local energy initiatives, semi-structured interviews were conducted. To arrange these interviews, roughly thirty existing contacts and partners from the Buurtwarmte network were contacted to see if they were interested in partaking in a short interview in which the roles of municipalities and local initiatives would be discussed. To guide these interviews, three figures were created by the research team that presented the public values, limitations and challenges for each of the roles of municipalities as seen by the research team. In the case that people were interested to share information but lacked time or interest in taking part in an interview, they were given the chance to send a written response instead. This was done to increase the amount of expert insight that could be gained from this study. In the end, two members of staff from municipalities and two members involved in energy initiatives were interested to taking part in an interview. Four other members of initiatives also provided a short, written response to the figures provided. No selection was made in regard to who was interviewed, as all those interested from the group that was contacted were in the end interviewed, partially due to a low response rate.

The municipalities of which the staff members were interview are medium to large sized city-based municipalities, which are involved with local energy initiatives within their municipality. The interviewees for the initiatives were both from the area of South Holland and were both, among other things, involved in the initiative "Energiek Leiden", which aims to ensure citizen participation in the energy transition for the city of Leiden.

From each interview, a detailed report was made that included the positioning of the initiative or municipality of the interviewee, their view on the different roles presented within the guidance figures, and any additional information for the discussions about those guidance figures and their content. The discussion about the guidance figures often brought up stories or other discussion topics that were relevant for the role division between municipalities and local energy initiatives.

For this research, the requests of Buurtwarmte were largely followed in regard to what was researched. It is mainly within the literature and interviews on the municipal roles that a lot of new insight was gained, partially by documenting already known information in a more accessible form for Buurtwarmte and partially by gaining the views from practise.

4. Research results

In this chapter the results of the study are presented. The results have been split into two larger sections in line with the two main research questions. The first section focusses on the expert validation of the development framework, while the second section displaces the result of the investigation into the role division between municipalities and local energy initiatives.

4.2 How far developed does a local energy transition initiative need to be in order to start the project development process?

In this section, the answer to the first main research question, namely the requirements that an initiative needs to meet in order to start the project development phase is presented. This was done

by validating and expanding on an existing development framework for initiatives from Buurtwarmte. Due to the size of the criteria table, a full list of both the initial and reviewed version in Dutch and English can be found in Appendix A.1 on page 32 .This also applies for the requirements on the area of stakeholder cooperation and government at the end of the initiation phase. a full list of both the initial and reviewed version in Dutch and English can be found in Appendix A.2 on page 37. The criteria will be referred to following their coding within the development framework itself, which means the letters, B, RT, SV and OF, refer to its category Resident participation (Buurtparticipatie (B)), Calculating and Designing (Rekenen en Tekenen (RT)), Cooperation and Permits (Samenwerking en Vergunningen (SV)) and Organisation and Financing (Organisatie en Financering (OF)) respectively with the number referring to its position within the ranking. The number behind the letters allow for direct connects to be indicated, meaning for example OF41 is an importantly related element of OF40.

Are the criteria used within the Buurtwarmte initiative development framework accurate, understandable for all parties, complete and non-redundant?

In this section, the answer to the first sub-question of the first main research question can be found. The answer was found by analysing the feedback from experts and insight of the research team. The full list of the initial and reviewed criteria in Dutch and English can be found in Appendix A.1 on page 32.

The first group of experts that reviewed the criteria list, were from EBO consult, a Danish partner of Buurtwarmte that also work with local energy initiatives related to district heating. In regard to the criteria list, they stated to have no remarks, other than that within their approach communication with local inhabitants (Including participation) was not their starting point. (Krabsen, 2021). They later indicated that the method they use to develop initiatives first consists of creating a legal entity with the group of initiative takers and developing a solid plan for the neighbourhood. Only as part of the plan development, more members of the community would be involved. (Christiansen, 2021)

The second group of experts consisted of members of the leading energy initiatives within the network of Buurtwarmte. Beforehand detailed feedback was received from one of the members of this group that could not be present during the panel discussion itself. His feedback was shared with the entire group to ensure his perspective was also taken into account during the panel discussion itself. During the panel discussion three main things became clear.

First of all, the exact purpose of the criteria list was discussed. Based the remark of some of the panellists it was determined that such a list should not be used as a checklist in which all boxes need to be check, instead it should be used as a checking guideline to ensure no subjects were missed by accident. This was due to the unexpectedness that exists during the realisation phase of such projects and due to differences existing in project context.

Secondly, it was found that using the organisation method that Buurtwarmte aims implement, related to the areas of development, as can be seen in Figure 2 on page 10, (Calculating and design, Organisation and financing, Stakeholder cooperation and government, Resident- participation and communication) were a good enough candidate to implement for these criteria. The remark was made that even though the criteria might be in different categories within the sorting system of different initiatives, this should be not an issue as the criteria itself can be traced.

Lastly, the consensus was made that based on the existing knowledge of those present, the list of criteria was complete. There were some minor textual remarks, however it was stated that no major

topics were missing. There were few remarks in regard to having a more logical order in certain criteria, specifically within the Calculating and Design category.

Based on the analysis of the written feedback from the not-present member, the general remarks from the panel discussion and the written remarks from one of the panellists, changes were made to the criteria list by the research team, in which the feedback from those parties was taken into account. The changed version of those criteria and a full overview of the reasoning behind the different changes is available in appendix A.1. The changes fall within five categories: category placement, order and organisation, additions, mergers and minor content adjustments.

Category placement

One important change was that the categories were reviewed and adjusted to better fit the four areas of development that Buurtwarmte uses. this meant that the category Organisation and Permits was renamed to Cooperation and Permits, and that Financing became Organisation and financing. This also meant that in order to ensure the criteria were in the right category, some criteria were placed in a different category or merged with existing criteria in another category. This also meant that the initial criteria about the requirements of the financers of the own capital as part of Organisation and Permits was split into two criteria. One is placed within Resident participation for the resident portion of the financers and one within the new category Cooperation and permits for non-resident financers.

These changes are mainly noticed within the Cooperation and Permits category and the Organisation and Financing category, where a high number of criteria were moved to or merged within the latter category.

Order and organisation

A few changes were also made to other aspects of the organisation and the order. In order to make the list feel more logical, two sets of two criteria from Calculating and Design were switched around, as it made more sense to first create the tendering document and find a building partner before creating the project plan and build planning, instead of the other way around. This was done in response to the request from the panel discussion with the leading initiatives.

Some adjustments were also made to the numbering of the criteria. Especially within the Cooperation and permits category, two criteria no longer had a reference number connected to *SV20: permits RT40 have been granted or are enforceable* but were given their own separate reference number (Becoming SV30 instead of being SV21).

Additions

It was felt that certain aspects of initiative development were not yet included in the list of criteria, this meant that some criteria were added to cover those aspects. Two criteria were added for the category of Organisation and Financing (OF) to include the legal aspects of the organisational development that initiatives have. Another category in which criteria were added was the Cooperation and Permits category, where more cooperation partners such as utility network operators and social housing corporations and business real estate owners were now also included. This was done based on the practical experience of Buurtwarmte.

Lastly one important additional was to extend the number of elements from the final design that were to be included in the criteria referring to this final design. This was done based on the feedback from the participants of the panel discussion.

Mergers

Some existing criteria were merged with other criteria, as they were moved into other categories where there would be significant overlap if the criteria were both kept. This mainly applied to the criteria related to the project plan and business case that were part of the category Cooperation and Permits, which were moved to Organisation and Financing.

Minor content adjustments

With some criteria minor issues were found with the criteria in regard to wording or missing internal references. Examples of this was the addition of the phrase "and contracted" to the criteria *RT71: Building partners have been selected* or the addition of a reference to *RT40: Permits, ground lease contracts and utilities are in sufficiently line with the design RT30 to start construction* to the criteria referring to those permits, ground lease contracts and utilities within the category Cooperation and Permits.

What are the requirements in the category of stakeholder cooperation that an energy initiative needs to meet in order to start the project development phase?

As initiatives develop from an idea to a full-fledged organisation, they will need to develop on many different areas for many different subjects. Part of this development takes place within the category of "Cooperation and Permits", this category covers the results of the interactions with all non-inhabitant partners that have a stake in the project, such as municipalities, governing organisations such as the Authority Consumer and Market (ACM) or local financers. To ensure that at the end of the initialisation phase, at least some attention has been given to engaging or considering the aspects of initiative development, a criteria list has been developed. This list is based on the initial list developed by Buurtwarmte and their partners and has been adjusted to fit the reviewed criteria and new expectations and insights from Buurtwarmte. Table 3 on page 17 shows the translated list of the reviewed requirements with their linked criteria. Due to the fact that the criteria within this category changed, adjustments were made to the requirements for those criteria as well. There were two major considerations within the changes made to the requirements.

The first is the consideration of how much certain stakeholders are/would be involved in the project development phase and the project as a whole. This can be seen in the different requirement descriptions between two of the newly added criteria, namely *SV11 Social housing corporations and/or business real estate owners have agreed with the project and their role in it* and *SV70 utility network operators have agreed to the project planning RT80.* The view is that social housing corporations and business real estate owners are more likely to have a greater involvement in this type of project as they are local property owners compared to utility network operators, who own (underground) infrastructure within the area. This can clearly be seen in the fact that utility network operators are involved in the neighbourhood energy plan, however with specific attention to allow them to determine the impact of the possible new infrastructure on their existing network.

Secondly, two of the criteria, SV40 and SV50, were adjusted to better match the amount of knowledge an initiative would have at that stage in their development. For SV50, the issue of who will hold the heat delivery permit was adjusted from having made the choice of who holds the permit and having started the process to obtain it to having investigated the permit and made a decision about if the initiative itself will try to obtain it. For SV40, a small change was made by removing a part in regard to having an initial estimate of the costs, as this was seen as not obtainable at this point in the development due to the high amount of work left to be done for the final heating solution for the neighbourhood.

Table 3: English translation of the reviewed criteria on the area of Stakeholder cooperation and permits

Cooperation and Permits	
Criteria	**Requirement**
SV10 Municipality has agreed with the project and its role in it.	The municipality, specifically the responsible alderman, verbally agrees with the Neighbourhood energy plan. Municipality can still have some reservations in regard to formal decision making (Energy source strategy/environmental plans/transition vision). The municipality has decided on how they will approach the given director role in regard to the project and the chosen role within it.
SV11 Social housing corporations and/or business real estate owners have agreed with the project and their role in it.	Social housing corporations and/or business real estate owners have been involved in the development of the Neighbourhood energy plan and agree with its content. Their further role in the project development phase has also been decided.
SV20 Permits RT40 have been granted or are enforceable.	Insight into the needed permits has been gained to give certainty that those can be obtained or that there are no further risks in the rest of the development.
SV30 Ground contracts RT40 are finalised, including rights in rem (ZRO).	The needed ground contracts (including ZRO) have been mapped, which includes a planning
SV40 Utility services RT40 have been contracted by the exploitation company OF20.	Insight into the needed utility connections for the chosen heating solutions has been gained.
SV50 Regulation authorities (ACM and other competent authorities) agree and have issued the heat supply permit and/or concession	Citizens collective has orientated itself in regard to the question if they want to hold their own heat delivery permit or if cooperation with a partner is desired for that.
SV60 Risks according to RT12 are placed with organizations or persons and accepted	Initial risk matrixes has been created in which the existing known risks have been identified.
SV70 Utility network operators have agreed to the project planning RT80.	Utility network operators have been involved in the making of the Neighbourhood energy plan and have considered the impact of it on the network infrastructure under their control.
SV80 The capital requirements of the non-resident financiers are in line with the business plan OF40.	Potential non-resident financers for the own capital have been identified.

Conclusion

To answer the first research question a list of requirements was created. The full list of requirements that an initiative needs to meet in order to progress to the project development phase on the area of Cooperation and Permits can be found in Table 3. From the analysis of the panel discussion and other expert, it was also found that the list of criteria is acceptable but should not function as a checklist that needs to be fully done, but more of a guidance to ensure all topics are at least considered within the development. The requirements themselves were not discussed with experts outside the research team, but the analysed remarks on the criteria also contained some remarks relevant for the requirements, producing a valid result and answer to the first research question.

4.2 Role division between municipalities and local energy initiatives

In this section, the answer on the second main research question, What are the options for the role division in the energy transition in the built environment for energy initiatives and municipalities?, is provided.

What roles can the municipality take in the development phase and what does that mean for the potential role of local initiatives?

Municipalities carry a lot of responsibilities, ranging from nationally decided policy such as providing identification documents, youth care or resident registration to locally decided policy such as providing subsidies and zoning plans (Rijksoverheid, 2021). Providing and checking environmental permits, including those needed for the construction of district heating systems, are included in the long list of municipal duties.

The Climate accord added another task to this list. Namely, to organise and manage the development of energy transition plans for their jurisdiction (Rijksoverheid, 2019). The method of creating these plans was preferred to be neighbourhood based and involving the residents. The issue however is that there was no clear description within the Climate Accord on how the organising and managing role would have to be conducted.

A second area in which the role of municipalities within the heat transition is changing is the new heat law. Within this law, municipalities get a lot more responsibilities and possibilities to control the heat transition, namely the ability to create and assign heat supply companies to plots. This should allow them to achieve their energy transition plans more effectively, however it still does not supply information on how municipalities can approach the energy transition and the cooperation with possible partners within it, such as local energy initiatives.

Roles from literature:

The literature provides two main ways to defining what the governmental role could include. The first direction is about what level of involvement or position the government has in relation to the issue, while the second direction is what perspective a governmental organisation takes regarding the task at hand. A full overview of the literature roles for municipalities within the energy transition can be found in Appendix C on page 45.

The distinction of government roles using different levels of involvement can clearly be found in research by Driessen et. al (2019) into the governmental role in climate adaptation initiatives. They define a ladder of government participation consisting of five steps. These are in order of least involvement to highest involvement: Letting go, Facilitating/enabling, stimulating, network steering and lastly regulating. An overview of these five roles with their descriptions can be seen in Table 4 on page 18.

Table 4: Governmental roles as defined by Driessen et.al (Adapted from Driessen, Hegger, Mees, & Uittenbroek, 2019)

Role	Role description
Regulating	Government regulates interventions by the community, so initiates, coordinates and decides (hierarchical government)
Network steering	Government (co-)initiates and creates a network of public and private stakeholders; it coordinates the decision-making process. Decisions are co-decided in the network
Stimulating	Government actively stimulates the initiation and continuation of community initiatives. Initiatives coordinate and decide independently from government
Facilitating/enabling	Initiatives are self-initiated, and the government has an interest in making them happen. Initiatives coordinate and decide independently from government
Letting go	Initiatives are self-initiated, self-coordinated and self-governed without the help of government

The roles as descripted by Driessen, et al. (2019) can be found in other pieces of grey literature, where the exact terms sometime differ, but the meaning behind roles are the same. An example of this, is a research rapport by Rebel (2019), which defines four roles, of which the description overlaps with four of the roles defined by Driessen, et al. (2019) with only the letting go role not being included. Often terms such as stimulate or facilitate also appear in the municipal policies, such as a document of the municipality of Hilversum about the participation of residents in the energy- and heat transition (Gemeente Hilversum, 2021).

Another advisory report that uses roles like those of Driessen, et al. (2019) was a report by TNO, four major municipalities and Platform 31, which defines 3 municipal roles (TNO, Platform_31, & G4, 2020). The first is “Besturen” or directing, which closely resembles the regulating role, the second is “Laveren” or letting go, which matches the description of facilitating and lastly “Navigeren” or navigating, which represent a mixture or regulating and stimulating, where the municipality sets the requirements and rules, but stays outside of it, other than provided financial support where needed.

The second way of looking at it, namely by the perspective, which is commonly known within governmental organisations, was developed by the Nederlandse School voor Openbaar Bestuur (NSOB). They defined governmental roles as four different perspectives, considering the changes within the society within the recent years (van Gerwen, Hajer, Kruitwagen, van der Steen, & Scherpenisse, 2014). The four perspectives they define are lawful (Rechtmatig), performing (Presterend), networking (Netwerkend) and lastly participating (Participerend). A full overview of each of their definitions can be found in Table 5 on page 19.

Table 5: Overview table of the four possible roles governments could take (Adapted from van der Steen, Scherpenisse, Hajer, van Gerwen, & Kruitwagen, 2014)

Perspective on the government	Description
Lawful	• Classical view on governmental involvement • Focus is on following procedures and fairness to reach the goals set within the political policies
Performing	• Views government as a business, with citizens as its customers • Focus is on setting goals and targets and finding the most efficient way to reach them
Networking	• Government is the leading factor to create links between the different parties involved. • Focus is on finding compromises and making agreements with the parties involved to reach the targets set within those agreements.
Participating	• Government stays back and provides support when asked. • Focus is on letting the market and citizens take the lead and support them as needed using the resources the government has.

There is clear overlap between these two ways of thinking. Fully letting go is not an option currently due to the legal obligations from the Climate accord and other legal guidelines, however only doing the legal responsibilities would fall within the lawful perspective. Facilitating closely resembles the participating perspective, stimulating would be possible from a participating and/or lawful perspective. The network steering role closely fits the description of the networking perspective and lastly regulating is very similar to the performing perspective.

This means there is a consensus within the (grey) literature on the possible roles a municipality can take within the heat transition and in extension of that within the interaction with local energy initiatives that need to have dealings with the municipality. This information on the roles is also useful for the role division between municipalities and initiatives as from these roles and those of the initiatives overlap for cooperation and possible conflicts could be identified that can help with the initiative's interactions with the municipality.

Information from the interviews and written statements on municipal roles within the heat transition

During the interviews and from the written statements, the consensus was that all four perspectives according to the NSOB system were recognised as roles that those asked had experienced from their interactions with or as part of a municipality. A five main points of attention and issues were brought up during the interviews.

First of all, it was stated that the exact perspectives change between departments within a municipality. A good example given in one of the interviews was the difference in attitude between a more legally bound department such as the real estate department, which more closely followed a lawful perspective and the energy transition department which often was much more in the participation/networking corner (Initiative_1, 2021).

Secondly, there was a difference between the viewpoint of the initiative- and municipal interviewees. The interviewees from the initiatives viewed the position of the municipalities with which they had contact as performing and networking, limited by the regulations with their interactions with the local energy initiatives (Initiative_1, 2021) (Initiative_2, 2021). They did indicate that there are experiments from municipalities with actions from the participating perspective. The municipal interviewees viewed their personal position with their municipality in regard to the energy transition as at least networking with large developments within the participation perspective while working within the existing regulations (Municipality_1, 2021) (Municipality_2, 2021). This means that the municipalities view themselves more within the position of networking and participating compared to how the initiatives view them.

Thirdly, it was also indicated that the municipalities did not always have all the knowledge, experience, or sufficient resources needed to handle the heat transition and this new approach. Municipalities also indicated that if they lacked the means or knowledge to properly engage with initiatives, they fall back into a performing role, to get the goal done (Municipality_1, 2021). This was also experienced by one of the initiatives, which due to already meeting the legal requirements of no longer relying on natural gas in the future, no longer were getting support from the municipality as they preferred to use their resources on other neighbourhoods that needed it more urgently (Initiative_1, 2021).

However, municipalities are improving their position and actions. This was clearly found in the difference in description of the cooperation with the municipality of Leiden between two of the initiative interviews where the description of later interactions was much more positive in regard to the resident participation (Initiative_1, 2021), (Initiative_2, 2021).

Fourthly, since municipalities are often taking a networking position, trust in initiatives was considered very important for them to be a full partner. However, local energy initiatives often still develop over time and goals and interests might shift over time. Therefor creating highly detailed cooperation agreements might limit what an initiative can develop into (Initiative_2, 2021). Related to this interaction between municipalities and indicatives the term "tussenruimte" was mentioned.

“Tussenruimte” is a term used to describe the differences between the position and attitude of municipalities and local energy initiative that needs to be considered for cooperation within the energy transition (Schuurs, 2021).

Lastly, participation is a two sides sword for initiatives. Listening to your residents means that also those opposing plans have to be heard as well, which can cause projects to fall through. The example was given of a wind project, that due to a group of opposing residents was cancelled, even though the project had a lot of local support including from multiple local energy initiatives (Initiative_2, 2021). This shows that municipalities taking the energy initiatives serious could have other effects regarding participation as a whole.

What roles can a local energy initiative take in the development phase and what does that mean for the potential role of the municipality?

Within this section the possible roles from literature and the information from the interviews on the role of local energy initiatives within the heat transition are presented in order to answer the second sub question of the second main research question.

Initiative roles from literature:

Local energy initiatives are complex systems, as the level of initiative and resident involvement, the partners of the initiative and how much of the heat chain it owns, all create different forms of initiatives.

The role of initiatives is mainly defined by the same views as citizen participation. This means the role is defined as a step on a participation ladder, such as those described in section 2.2 Participation on page 9 .This view can be found in a rapport by Hier Opgewekt, where they clearly define the position of the residents, and in extension of local energy initiatives in a ladder with more influence after each step (Klip & van Boxtel, 2020). The steps defined by Hier Opgewekt can be found in Table 6 on page 21, where both the description of the step and the step from Mosert (2003) that best suits that step is added.

Table 6: Initiative role defined by the participation ladder (Adapted from Klip & van Boxtel, 2020)

Step defined by Klip & van Boxtel (2020)	Description	Steps based on Mosert (2003)
Informing (Informeren)	Residents are informed of the project/process. The developing party decides and residents have no actual input.	Information
Consultation (Raadplegen)	Residents used for feedback within the development of the process/product. The developer decides the agenda and how and when to engage with the residents and what do to with any feedback.	Consultation
Advising (Adviseren)	The residents are seen as a source of input (not just feedback) for the development of the process/product. The input from residents is given a proper place within the	Discussion

	adjustments to that development and the developer has to give proper reasoning for changes.	
Co-production (Coproduceren)	Residents are a fully fledged partner of the developer. (organised or not). They work together to find an agreed upon solution and a nice process to get there.	Co decision making
Self-organising (Zelf organiseren)	Residents take the initiative, they own the product and process and could become the client for future developers.	Decision-making

It is important to note that Hier opgewekt only views the top two steps, co-production and self-organising as actual resident participation. This means that initiatives could take place with as goal to help with informing, consulting or advising, but that those are not really forms of proper participation as the input from inhabitants is not considered or can be put aside if the developer decides to.

In regard to how much a local energy initiative owns of its heat supply chain, Hier Opgewekt also considers the ownership over heat networks not as one whole system owned by the same entity, but as something that can be seen as three parts, which each could be held by a different owner. These three parts are the source (Heat production), the network (transport for distribution of heat) and delivery (Klip & van Boxtel, 2020). This view that a heating solution is not automatically one system fully owned by one party is also shared by the VNG, UVW and IO in their reaction to the new Heat Act 2.0. Here they also state that ownership over the heat source or heat distribution network should not automatically assumed to be the heat supply company (Vereniging van Nederlandse Gemeente, Unie Van Waterschappen, & Interprovinciaal Overleg, 2021). Therefor you can have initiatives only responsible for the delivery of heat, meaning other parties hold ownership and responsibility over the source and distribution network with contracts to guarantee the delivery to the initiative owned parts, or initiatives that hold the entire chain.

The last element of the position of local energy initiatives are what parties they cooperate with in order to develop and run their heat supply company. Buurtwarmte views a change in perspective where local energy initiatives are becoming more common and that they are taking a position in the classical situation where the government work with the market to get things done (Notten, 2020). This is also visualized in Figure 4 on page 23. This means initiatives work with different types of partnerships to reach its goals. They could do it all on their own, without the involvement of the larger commercial energy developers, such as Vattenfall or the municipality, but they can also cooperate with the government or commercial partners.

Figure 4: View of Buurtwarmte on the position of energy initiatives (Notten, 2020)

Using this point of view on cooperation from the perspective of local energy initiatives allows for four options in regard to their position in the cooperation with the market and government where residents are actually involved:

- No cooperation with government or market, meaning the initiative fully develops and runs its own organisation. (This would place the initiative in the same position as a commercial party, but then locally owned)
- Cooperation with the government, meaning a municipality or waterboard could hold a stake in ownership or sharing risks.
- Cooperation with the market, meaning a likely partial ownership of commercial energy developer.
- Cooperation with both government and market. Meaning involvement of both energy developers and governmental institutes within the final heat supply company.

Each of these forms of cooperation likely have their benefits and disadvantages, depending on the exact composition and context in which a local energy initiative operates. However, that falls outside of the scope of this research.

Information on local energy initiative roles from interviews and written statements

During the interviews conducted to discuss municipal and initiative roles in the energy transition, local energy initiatives were often brought up, but discussed in lesser detail compared to the municipal role. In the written responses, not much was given about the role of initiatives and most reflected only on the role of the municipalities, as that was the main substance of the pictures.

Within the interviews, different specific initiatives were brought up. An initiative mentioned by both interviews conducted with initiatives was Energiek Leiden. This initiative works on different levels of the participation. The initiative has ownership of multiple wind turbines, aids the municipality of Leiden with the management of Energy advisors and works together with other partners to advise the municipality on climate actions (Initiative_1, 2021), (Initiative_2, 2021), (Energiek Leiden, 2021). This means the initiative is active on the area of self-organising, informing and advising.

A second initiative that was named was Energiek Poelgeest, where specifically their activities in regard to investigating the use of aqua thermal heating solutions as part of an existing gas fuelled district heating network (Initiative_1, 2021). This initiative is co-creating with a larger commercial partner, Vattenfall, who owns the district heating network to investigate it. This means that the initiative works based on a cooperation between the commons represented by the local energy

initiative and the market. It is specifically noted that the municipality has chosen to not take any significant roles within the project.

The last specific initiative mentioned was Gaasperdam Groen gas. This is a co-creation project of a local energy initiative with the municipality of Amsterdam and a few other partners. Here a local energy initiative initiated the contact with municipality with an interest in cooperation for among other things to investigate and develop a sustainable alternative for the exiting natural gas used in the neighbourhood, namely green gas (Municipality_1, 2021), (Gaasperdam Groen gas, 2021). This also places the initiative in a place of co-creation with the municipality and all its partners.

During the interviews, two aspects of initiative development were brought up, namely professionality of the initiative and the legitimacy of the initiative (Initiative_1, 2021), (Initiative_2, 2021), (Municipality_1, 2021), (Municipality_2, 2021). The professionality of the initiative was considered in how good and trusted of a partner an initiative would be. This is related to the fact that many local energy initiatives start as nothing more than an idea from a few residents who work on it on a voluntary basis and slowly develops and evolves into a much more serious operation, in some cases a cooperative heat supply company. An initiative being able to prove that they are knowledgeable on the topic of the heat transition and organisation & finance is an important factor for municipalities within their decision to cooperate with them for the energy transition. Having the ability to communicate clearly and patiently with organisations such as municipalities is also very important for municipalities. Both of these two factors, knowledge and communication, were indicated to be important for municipalities to trust initiatives and give them an equal position at the table during cooperation.

The second issue for initiatives is legitimacy, mainly in the form of neighbourhood support. Multiple interviews brought up the issue of it being uncertain if an initiative actually has enough support from the residents to actual be considered a proper representative of the neighbourhood allowing them to be a partner, or if they lack this legitimacy. This was highlighted with an example within Amsterdam, where a local initiative offered to take over part of the informing that the municipality was planning to do, in the form of delivering letters on the energy transition plans (Municipality_1, 2021). However, due to the municipality having existing trusted partners for this, they declined the offer and later found out that this initiative has previously done a neighbourhood survey, in which not the full neighbourhood (accord to the definitions of the municipality) was included. This shows an example where the initiatives might not always represent enough of the intended community. It was specifically mentioned that local energy initiatives are often created and led by those of older age, often already retired, creating a large chance that there would a disconnect between that generation and the younger generations within a neighbourhood (Initiative_2, 2021). This again comes back to the issue of municipalities need a certain level of trust and confidence towards the capabilities and support of an initiative in order to give up part of their legally assigned control and allow space for an initiative to develop and partake in the discussions.

Final remarks on the role division between municipalities and initiatives within the heat transition

To find the answer on the second research question, information on the role division between municipalities and initiatives, the possible roles of each of the two parties were investigated, of which the results can be compared to each other. From the literature and expert insight, it becomes clear that there are a range of roles initiatives and municipalities can take, however it is also clear that some of those combinations might not line up. The municipality has to conduct their legally required tasks but has possibilities in regard to their further position within the energy transition. An example of the positions not lining up would be if an initiative is looking for a co-creation partner

within the municipality but the municipality desires to only provide financial stimulation, the parties will have to reconsider their position and cooperation. This does not mean initiatives automatically fail if the position of the municipality line up with what it is desired of them by the initiative, as changes could be made on both sides. The interviews provided the insight that the uncertainty at the municipalities that currently exist for the cooperation with initiatives is reducing. This makes it more likely that the attitude of a municipality might change over time to be more favourable towards cooperation with local energy initiatives and taking on a more participating role within the energy transition process. Therefore, taking certain risks by giving control to other parties.

This play for position within the role division also involves any developments the initiative goes through with changes in interests or active members, which can all change the role an initiative would want to take and the trust the municipality might have in the organisation.

To conclude, there are absolutely roles divisions in which the role and expectations of initiatives line up with the role and expectations of the municipalities and even if not at this time, changes over time in both the municipality and initiative might align them better.

5. Discussion

Two main questions were answered in order to further develop the knowledge on the standardization of the development of local energy initiatives. Firstly, a development framework with criteria and requirements for local energy initiatives at the end of the initiation phase was reviewed, partially by experts. Secondly, an important element within the development of initiatives, namely the role division with one of the main stakeholders, the municipality was investigated for possible positions for both the municipality and the local energy initiatives with additional information gained about how the interaction takes place in practise. However, there are still a few things to consider.

Firstly, for the initiative development framework, specifically the criteria for the whole development process and requirements for only the end of the initiation phase were researched. The requirements were not included in the one panel discussion held with the experts from local energy initiatives, which focussed on the criteria. This meant that even though the first sub question of the first research question was answered, the second sub question regarding the requirements was not fully answered. Due to the lack of a specific panel discussion on the requirements, no detailed expert validation was gained on those requirements, meaning that only the derived information from the criteria panel discussion and the views of the research team were used to adjust the criteria. This does mean a list of requirements was found, providing an answer to the research question, but it is less valid due to the lack of expert input, which a dedicated panel discussion might have provided. It could be included in future research. The second factor related to the panel discussion is that it was only held with members of energy initiatives, and did not included other experts from the energy transition that cooperate with initiatives. This means that the requirements obtained within this research are mainly based on the perspective of the initiatives, and including other experts might have provided insight from the other perspectives on the development of local energy initiatives.

Secondly, for the role of municipalities within the energy transition and governance as whole, a lot of literature and related material was available. It is important to note that due to a lack of specialised knowledge in the field of public administration and the limitations put on the (grey) literature search, some relevant material discussion alternative roles for governmental organisation might have been missed. A second factor related to the literature is that most documents are either theoretical documentation or policy documents on certain positions, not reports on the experiences of the municipalities within the heat transition or with their interactions with initiatives. This is likely related

to the fact that the responsibility of organising the energy transition is only been given to municipalities for a few years, in which initiatives still need to pop up and develop in order to reflect on existing experiences. This means the results of this research are applicable to the current situation, and therefor largely reliable, however new insight from future developments might change the applicability of this research.

Thirdly, for the role of initiatives within the energy transition, most (grey) literature sources use the typical participation ladder as the core method to describe the role of local energy initiatives within the heat transition. This might fit the image of local energy initiatives being resident led, however might not fit the other positions initiatives can take properly. In some cases, initiatives consist of resident-led companies rather than a communication group for the energy transition. This means more of a commercial perspective of their role would fit those types of initiatives much better and being put into a place as just a "group of residents" hinders their position within a networking government looking for trusted partners. This was also reflected within the interviews, where professionality and legitimacy of the initiative was discussed in each interview, indicating at least its relevance for the position of initiative compared to the municipality.

Fourth is the use of the guidance pictures within the interviews conducted for this research. The guidance pictures focussed on the role of the municipality within the energy transition and contained much less on the role of initiatives. This meant a greater part of the interviews was about the role of municipalities in the energy transition, increasing the amount of results for the municipal role compared to the role of the initiatives. This might have come from a higher personal interest in the municipal position compared to the initiative's position or the fact that more diverse viewpoints were available on the role of municipalities compared to the viewpoints on the role of initiatives. The guidance pictures also caused some of the discussion to be about the descriptions on the pictures themselves and even though it might become useful for Buurtwarmte, that did not contribute further to this research.

Lastly, similar to the low number of panel discussions for the development framework, only two sets of two interviews were conducted to measure the initiatives and municipal viewpoints on the role of municipalities and initiatives in the energy transition. This was mostly due to a lack of time and low response rate, however with more available time more interviews could have been conducted, possibly providing a larger range of experiences from both municipalities and initiatives. This does not mean the information gained from the four interviews is less valuable, it mainly means some of the insight gained into the municipal and initiative roles might not be as generalizable as could be desired.

As a conclusion to this section, it can be said that a lot more information can be gathered on the standardization of the development of local energy initiatives, via the involvement of more experts and reviewing a large range of documents. However, this collection of knowledge on this topic can used as a steppingstone to further research on this topic by Buurtwarmte.

6. Conclusion

This research was conducted to gain more insight in the standardization of the development of local energy initiatives operating in the area of the heat transition. For this, two main research questions had to be answered: 1) How far developed does a local energy transition initiative need to be in order to start the project development process and 2) What are the options for the role division in the energy transition in the built environment for energy initiatives and municipalities.

For the first question, an existing list of criteria and requirements was improved to be used to measure the progress. This improvement was based on an analysis of the information gained during a panel discussion with Buurtwarmte experts from initiatives and from new insight of the research team. The improvements consisted of a major reorganisation of the criteria, the addition of aspects that were considered missing or insufficiently covered and other smaller adjustments. In the end a clear list of criteria for the whole development process and a list of requirements for an initiative to start the project development phase were created. The revised list of criteria can be found in Appendix A.1: English and Dutch versions of the criteria on page 32 and the table containing the requirements can be found in Table 3 on page 17 or in Appendix A.2: English and Dutch versions of the requirements on page 37.

To answer the second research question, literature research was conducted to find and compare the current views on the issue of the municipal and initiative roles within the energy transition and the impact of the role choice. For the municipal role, two main ways of defining it were found in literature. The first follows a version of the participation ladder, while the other uses four different perspectives on involvement. Both definitions can be found in the section What roles can the municipality take in the development phase and what does that mean for the potential role of local initiatives? on page 1817. For the local energy initiatives three way of defining their position was found. One is similar to the participation ladder; the second indicates what elements of the heat supply chain the initiative controls and the last one defines by what cooperation an initiative engages in. These can be found in section What roles can a local energy initiative take in the development phase and what does that mean for the potential role of the municipality? on page 21

Using this literature background, four interviews were held with members of initiatives and municipalities about the role of municipalities and local energy initiatives. These interviews were guided by a self-developed set of figures on the municipal role based on the role division as envisioned by Van Gerwen, Et al. (2014). Some written responses were also provided into the position of those two stakeholders based on those images. An analysis of these conversations and remarks confirmed that the information found within literature at least partially reflected the situation in practise. Within the interviews, it also became clear that, there was a difference of perception between the municipalities and initiatives about the exact position of the municipality in the interaction with initiatives and the energy transition in general.

The general answer to the second main research question on the role division between municipalities and initiatives, it was found that there are role choices that allow for a smooth cooperation between the two parties and role choices that place them at odds with each other and that two factors, legitimacy and professionality are very important within the development of initiatives to gain trust with the municipalities.

In the end, insight was gained into the standardization of initiative development in the form of a list of requirements that can be used as a guideline to measure progress for a certain point and clear information on the possible roles of municipalities and initiatives and some considerations to the effects of the role choice.

7. Recommendations for future research

This study found valid answers to the research questions posed to reach the research objective. The results however also show some gaps within the research where more knowledge could be obtained on the standardization of initiative development.

Firstly, for the further improvement to the Buurtwarmte initiative development framework, more research could be conducted. As stated, this study involved a readily available and willing group of experts, both that were limited in the number of experts and area of expertise. This means for a more detailed image of initiative development, there might be other stakeholders involved within the energy transition, such as the province staff, utility company staff or municipal staff that could also provide information on what areas are important for initiative development based on their experiences. This could also involve less experienced initiatives to see how they view their own development and if the goals set by Buurtwarmte are feasible from their experiences.

Secondly, the Buurtwarmte framework currently applies on seven of the twelve steps and only the requirements at the end of the initiation phase were investigated within this research, meaning not only can further research be put into expanding the criteria list for all twelve steps, also completing, and verifying the requirements at the other eleven steps. This could provide a view on what criteria are important within the realisation phase but might also bring up criteria that were not yet included in the framework due to a lack of knowledge on the realisation phase. This would allow for a smoother development and less unexpected obstacles during the realisation phase for initiatives. Buurtwarmte could investigate this further via more panel discussions or interviews for the general line with written responses being most effective for highly detailed expert feedback.

Thirdly, this study focussed on literature that described the municipal role within the energy transition, this means some literature on governance might not have been included due to this limited scope and more information could be gained from investigating if more information can be found in a wide scope of literature which could still apply on the energy transition.

Second to last, to find information on the practise of municipalities and initiatives, four interviews were held. The interviewees were from somewhat similar positions (similar municipality and involved in the same initiative) meaning having interviews with a more diverse group of municipalities, including for example smaller agricultural municipalities, could provide more insight in how they handle the situation from a different perspective. This also applied to the initiatives. This study found that there is a larger range of what an initiative can do, therefor talking with more initiative that are placed in different areas of that range could provide more insight on regional differences in the viewpoints and experiences, for example between urban and agricultural municipalities.

Lastly, there is one general line through all of this. This research mainly looked at the “what” question. The research found what roles are possible for initiatives and municipalities and found some information on what some areas are that could create conflict. However, this study did not for example investigate *how* you can establish a relation with a municipality so you can discuss cooperation. This means a lot more research should conducted into the methods of meeting the requirements as stated within the initiative development framework in order to make the cooperation with municipalities a smoother process, decreasing the likeliness of failure to a failed cooperation with the municipality.

The heat transition is an area where initiatives are a relatively new player in the market and their development and interactions with other stakeholders is an area where a lot more knowledge might be available to be revealed in further research, further improving the knowledge on how initiatives develop, allowing them to aid in reaching the national goals for the heat transition.

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Appendix A:

In this appendix, the full lists of the criteria and requirements in both the original Dutch and the translated English version.

Appendix A.1: English and Dutch versions of the criteria

Initial list of criteria

Bewonersparticipatie	Resident participation
B10 Draagvlak voor warmteoplossing vanuit bewoners (toekomstige afnemers)	B10 Support for the selected heating solution from the residents (Future clients)
B11 Draagvlak voor financiële inbreng vanuit bewoners	B11 Support for the financial contribution from the residents
B12 Keuze gemaakt voor model van participatie/invloed	B12 choice has been made of the model of participation/influence
B20 Warmteleveringsovereenkomst is getekend tussen Warmtebedrijf en afnemers	B20 Heat supply agreement has been signed between heating company and its clients
B30 Woningen voldoen aan technische criteria voor de warmteoplossing of B40	B30 Houses meet the technical criteria for the selected heating solution or B40
B40 Woningen hebben contract voor aanpassing naar technische criteria of B30	B40 Houses have contracts for the adjustments that need to be made in order to meet the technical criteria or B30
B50 Financiering BAK (Bijdrage aansluitkosten) en aanpassing van de woning door woningeigenaren of B60	B50 Financing BAK and adjustment to the houses by the residents or B60
B60 Financiering BAK en aanpassing woning door financier	B60 Financing BAK and adjustments to the houses by the financier.
B61 Standaard aanbieding BAK en woningaanpassing financiering door financier is geaccordeerd & beschikbaar	B61 Standard offer contribution connection costs and house adjustments financing by financier is approved and available.
B70 Bewoners zijn i.g.v. coöperatief warmtebedrijf - lid en hebben vertrouwen in het gekozen bestuur	B70 In case of a cooperative heating company, the residents are members and trust the chosen board

Rekenen en Tekenen	Calculation and Design
RT10 Businesscase is inzichtelijk en haalbaar	RT10 Business case is clear and feasible
RT11 Kostencalculaties zijn inzichtelijk en gevalideerd	RT11 Cost calculations are clear and have been validated.
RT12 Risico's zijn inzichtelijk, belegd en mitigerende acties zijn in gang gezet	RT12 Risks are clear, placed with organizations or persons and mitigating actions have been initiated.
RT20 Business case is geaccepteerd	RT20 Business case has been accepted.
RT30 Definitief ontwerp en bestek - Productie-installatie - Leidingnet - Gebouw-aansluiting - Besturing en bediening	RT30 Final design and building plans -Production system -Heat pipe network -Connections to the buildings -Control strategy and operation
RT31 Technische aansluitvoorwaarden beschikbaar inclusief een sluitende beschrijving van de minimale eisen aan de CV installatie	RT31 Technical connection conditions available, including a conclusive description of the minimum requirements for the central heating installation.
RT40 Vergunningen, grondcontracten en nutsvoorzieningen zijn in lijn met ontwerp RT30 afgerond of voldoende geacht voor start uitvoering	RT40 Permits, Ground lease contracts and utilities are in line with the design. RT30 has been complete or is considered sufficient for starting construction.
RT50 Aanneem-, leverantie- en dienstenovereenkomsten zijn in lijn met ontwerp RT30 en kostencalculaties RT11	RT50 Building -, delivery - and service-contracts are in line with the design RT30 and cost calculation RT11.
RT60 Beheer- en exploitatieplan is gereed op basis van ontwerp RT30	RT60 Maintenance- and operational plan is complete based on design RT30
RT70 Projectplan voor de bouw in overeenstemming met RT10, RT20, RT30, RT40, RT50 en RT60	RT70 Project plan for construction is in agreement with RT10, RT20, RT30, RT40, RT50 en RT60
RT71 Bouwplanning is akkoord (als onderdeel van RT70)	RT71 Construction planning has been agreed upon. (As part of RT70)
RT80 Aanbestedingsdocument is gereed	RT80 Tender document is ready.
RT81 Bouwpartners zijn geselecteerd	RT81 Construction partners were selected.
Organisatie	**Stakeholders and governance**
OV10 Gemeente is akkoord met het project en haar rol daarbinnen	OV10 Municipality has agreed with the project and its role in it.
OV20 Entiteit Eigenaar/opdrachtgever is formeel akkoord met het projectplan RT70	OV20 Entity Owner/commissioning party has formally agreed with the project plan RT70.
OV21 Aandeelhouders/coöperanten van opdrachtgever zijn formeel akkoord met het projectplan RT70 en Businessplan F10	OV21 Shareholders/members of the cooperative have formally agreed with the project plan RT70 and Business plan F10

OV30 Vergunningen zijn verleend of afdwingbaar	OV30 Permits have been granted or are enforceable.
OV31 Grondovereenkomsten zijn (waaronder ZRO- zakelijk recht overeenkomst) afgesloten	OV31 Ground contracts are finalised, including rights in rem (ZRO).
OV32 Nutsvoorzieningen (stroom, gas, communicatie) zijn gecontracteerd	OV32 Utility services (electricity, gas, communication) have been contracted.
OV40 Toezichthouders (ACM en andere bevoegde gezagen) zijn akkoord en hebben de warmteleveringsvergunning en/of concessie verleend.	OV40 Regulation authorities (ACM and other competent authorities) agree and have issued the heat supply permit and/or concession.
OV50 De eisen van de financiers van het eigen vermogen zijn in lijn met het businessplan F10	OV50 The capital requirements of the financiers are in line with the business plan F10.
OV60 De eisen van de financiers van het vreemd vermogen zijn in lijn gebracht met het businessplan F10	OV60 The requirements of the financiers of the loan capital have been brought into line with the business plan F10.
OV70 Risico's volgens RT12 zijn belegd en geaccepteerd	OV70 Risks according to RT12 are placed with organizations or persons and accepted
OV 80 Entiteit Eigenaar/opdrachtgever is professioneel georganiseerd en besluitvorming is eenduidig	OV80 Entity owner/client are professionally organised and decision making is unequivocal.
OV91 Sleutelposities in bestuur en personeel zijn ingevuld met de juiste competenties daarin geborgd	OV91 key positions in the board and personnel have been filled, who all have the right competencies.
OV92 Entiteit Eigenaar/opdrachtgever is opgericht en beschikt over de ingerichte processen & middelen om de operatie en strategie effectief uit te voeren	OV92 Entity Owner/commissioning party has been established and has the, for that purpose developed, processes and means to effectively execute the activities and strategy.
Organisatie en Financiering	**Organisation and financing**
F10 Aandeelhouders zijn akkoord met het business plan te weten de Businesscase (RT10), ontwerp (RT30), beheer en exploitatieplan (RT60) en het projectplan voor de bouw (RT70)	F10 Shareholders have agreed with the business plan, which includes the Business case (RT10), design (RT30), Management- and operational plan (RT60) and Project plan for construction (RT70)
F23 Er is voldoende eigen vermogen ingebracht en gestort in het warmtebedrijf om de aanleg te kunnen starten	F23 Sufficient equity has been contributed and invested into the heat company to initiate the construction.
F30 Financieringscontracten voor vreemd vermogen zijn gesloten en uitbetaalbaar.	F30 Financing contracts for loan capital have been concluded and are payable.
F40 Gedetailleerde tijdgebonden begroting en cash forecast is beschikbaar en geaccordeerd in lijn met projectplan RT70 en RT20	F40 Detailed, time-bound budgets and cash forecasts are available and agreed upon in line with the project plan RT70 and RT20.
F50 Serviceproviders voor exploitatie en beheer zijn gecontracteerd in lijn met RT60	F50 Contracts have concluded with service providers for maintenance and operation in line with RT60.

List of the reviewed criteria

Bewonersparticipatie	**Resident participation**
B10 Draagvlak voor warmteoplossing en RT31 vanuit bewoners (toekomstige afnemers)	B10 Support for the selected heating solution from the residents (Future clients)

B11 Draagvlak voor financiële inbreng vanuit bewoners voor eigen vermogen OF50	B11 Support for the financial contribution from the residents
B12 Keuze gemaakt voor model van participatie/invloed	B12 Choice has been made for the model of participation/influence
B20 Warmteleveringsovereenkomst is getekend tussen Warmtebedrijf en afnemers	B20 Heat supply agreement has been signed between heating company and its clients
B30 Woningen voldoen aan technische criteria voor de warmteoplossing of B40	B30 Houses meet the technical criteria for the selected heating solution or B40
B40 Woningen hebben contract voor aanpassing naar technische criteria of B30	B40 Houses have contracts for the adjustments that need to be made in order to meet the technical criteria or B30
B50 Financiering BAK en aanpassing van de woning door woningeigenaren of B60	B50 Financing BAK and adjustment to the houses by the residents or B60
B60 Financiering BAK en aanpassing woning door financier	B60 Financing BAK and adjustments to the houses by the financier.
B61 Standaard aanbieding BAK en woningaanpassing financiering door financier is geaccordeerd & beschikbaar	B61 Standard offer contribution connection costs and house adjustments financing by financier is approved and available.
B70 Bewoners zijn i.g.v. coöperatief warmtebedrijf - lid en hebben vertrouwen in het gekozen bestuur	B70 In case of a cooperative heating company, the residents are members and trust the chosen board
B80 De eisen van de bewoners als financier van het eigen vermogen zijn in lijn met het businessplan OF40	B80 The requirements of the residents as financers of the own capital are in line with the business plan OF40
Rekenen en Tekenen	**Calculating and Designing**
RT10 Businesscase is inzichtelijk en haalbaar	RT10 Business case is clear and feasible
RT11 Kostencalculaties zijn inzichtelijk en gevalideerd	RT11 Cost calculations are clear and have been validated.
RT12 Risico's zijn inzichtelijk, belegd en mitigerende acties zijn in gang gezet	RT12 Risks are clear, placed with organizations or persons and mitigating actions have been initiated.
RT20 Business case RT10 is geaccepteerd	RT20 Business case has been accepted.
RT30 Definitief ontwerp en bestek - Productie-installatie (Bron en Opslag) - Leidingnet (Inclusief warmte overdrachtstations) - Gebouw-aansluiting - Besturing en bediening	RT30 Final design and building plans -Production system (Bron and storage) -Heat pipe network (Including heat transfer stations) -Connections to the buildings -Control strategy and operation
RT31 Technische aansluitvoorwaarden beschikbaar inclusief een sluitende beschrijving van de minimale eisen aan de CV installatie	RT31 Technical connection conditions available, including a conclusive description of the minimum requirements for the central heating installation.
RT40 Vergunningen, grondcontracten en nutsvoorzieningen zijn in lijn met ontwerp RT30 afgerond of voldoende geacht voor start uitvoering	RT40 Permits, Ground lease contracts and utilities are in line with the design. RT30 has been complete or is considered sufficient for starting construction.
RT50 Aanneem-, leverantie- en dienstenovereenkomsten zijn in lijn met ontwerp RT30 en kostencalculaties RT11	RT50 Building -, delivery - and service-contracts are in line with the design RT30 and cost calculation RT11.

RT60 Beheer- en exploitatieplan is gereed op basis van ontwerp RT30	RT60 Maintenance- and operational plan is complete based on design RT30
R70 Aanbestedingsdocument is gereed	RT70 Tender document is ready.
R71 Bouwpartners zijn geselecteerd en gecontracteerd	RT71 Construction partners were selected and contracted.
RT80 Projectplan voor de bouw in overeenstemming met RT10, RT20, RT30, RT40, RT50 en RT60	RT80 Project plan for construction is in agreement with RT10, RT20, RT30, RT40, RT50 en RT60
RT81 Bouwplanning is akkoord in overeenstemming met de bouwpartners (RT71) (als onderdeel van RT80)	RT81 Construction planning has been agreed upon. (As part of RT80)
Samenwerking en Vergunningen	**Cooperation and Permits**
SV10 Gemeente is akkoord met het project en haar rol daarbinnen	SV10 Municipality has agreed with the project and its role in it.
SV11 Woningcorporatie en/of Zakelijke vastgoedeigenaren zijn akkoord met het project en haar rol daarbinnen	SV11 Social housing corporations and/or business real estate owners have agreed with the project and their role in it.
SV20 Vergunningen RT40 zijn verleend of afdwingbaar	SV20 Permits RT40 have been granted or are enforceable.
SV30 Grondovereenkomsten RT40 zijn (waaronder ZRO) afgesloten	SV30 Ground contracts RT40 are finalised, including rights in rem (ZRO).
SV40 Nutsvoorzieningen RT40 zijn gecontracteerd door exploitatiebv OF20	SV42 Utility services RT40 have been contracted by the exploitation company OF20.
SV50 Toezichthouders (ACM en andere bevoegde gezagen) zijn akkoord en hebben de warmteleveringsvergunning en/of concessie verleend.	SV50 Regulation authorities (ACM and other competent authorities) agree and have issued the heat supply permit and/or concession
SV60 Risico's volgens RT12 zijn belegd en geaccepteerd	SV60 Risks according to RT12 are placed with organizations or persons and accepted
SV70 Netbeheerder is akkoord met de projectplanning RT80	SV70 Networkoperators have agreed to the project planning RT80.
SV80 De eisen van de financiers van het eigen vermogen niet zijnde de bewoners B80 zijn in lijn met het businessplan OF40	SV80 The capital requirements of the non-resident financiers are in line with the business plan OF40.
Organisatie en Financiering	**Organisation and Financing**
OF10 Bewonerscooperatie is opgericht	OF10 Resident cooperation has been established
OF20 Exploitatiebv is opgericht	OF20 Exploitation bv has been established
OF30 Financiering van het voorbereidingsproces geregeld	OF30 Financing of the preparation process is arranged
OF40 Aandeelhouders/coöperanten zijn akkoord met het business plan te weten de Businesscase (RT10), ontwerp (RT30), beheer en exploitatieplan (RT60) en het projectplan voor de bouw (RT80)	OF40 Shareholders/cooperators agreed with the businessplan, which includes the Business case (RT10), design (RT30), Management- and operational plan (RT60) and Project plan for construction (RT70)

OF41 Vreemd vermogen verstrekkers zijn akkoord met businessplan OF40	OF41 Loan capital providers agree with the business plan OF40
OF50 Er is voldoende eigen vermogen ingebracht en gestort in het warmtebedrijf om de aanleg te kunnen starten	OF50 Sufficient equity has been contributed and invested into the heat company to initiate the construction.
OF51 Financieringscontracten voor vreemd vermogen zijn gesloten en uitbetaalbaar.	OF51 Financing contracts for loan capital have been concluded and are payable.
OF60 Gedetailleerde tijdgebonden begroting en cash forecast is beschikbaar en geaccordeerd in lijn met projectplan RT80 en Businesscase RT20	OF60 Detailed, time-bound budgets and cash forecasts are available and agreed upon in line with the project plan RT80 and RT20.
OF70 Serviceproviders voor exploitatie en beheer zijn gecontracteerd in lijn met RT60	OF70 Contracts have concluded with service providers for maintenance and operation in line with RT60.
OF80 Entiteiten OF10 en OF20 zijn professioneel georganiseerd en besluitvorming is eenduidig	OF80 Entity owner/client are professionally organised and decision making is unequivocal.
OF81 Sleutelposities in bestuur OF10 en personeel OF10 en OF20 zijn ingevuld met de juiste competenties daarin geborgd	OF81 key positions in the board and personnel have been filled, who all have the right competencies.
OF82 Exploitatiebv OF20 beschikt over de ingerichte processen & middelen om de operatie en strategie effectief uit te voeren	OF82 Entity Owner/commissioning party has been established and has the, for that purpose developed, processes and means to effectively execute the activities and strategy.

Appendix A.2: English and Dutch versions of the requirements

Initial list of requirements

Organisation and Permits		**Organisatie & Vergunningen**	
Criteria	**Requirement**	**Criterium**	**Eis**
OV10 Municipality has agreed with the project and its role in it.	The municipality, specifically the responsible alderman, verbally agrees with the Neighbourhood energy plan. Municipality can still have some reservations in regard to formal decision making	OV10 Gemeente is akkoord met het project en haar rol daarbinnen	De gemeente is betrokken en stemt bij monde van de betrokken wethouder in met het Buurtenergieplan. Gemeente kan nog voorbehoud hebben t.a.v. formele besluitvorming
OV20 Entity Owner/commissioning party has formally agreed with the project plan RT70.	In the neighbourhood energy plan states what entity is planned to act as the owner/commissioning party	OV20 Entiteit Eigenaar/opdrachtgever is formeel akkoord met het projectplan RT70	In het Buurtenergieplan staat welke entiteit beoogd is om op te treden als Eigenaar/opdrachtgever
OV21 Shareholders/members of the cooperative have formally agreed with the project plan RT70 and Business plan F10	Based on a poll, conversations or a formal vote, it is clear that the (future) voting members/ shareholders / supervisors support the neighbourhood energy plan	OV21 Aandeelhouders/coöperanten van opdrachtgever zijn formeel akkoord met het projectplan RT70 en Businessplan F10	Op basis van een peiling, gesprekken of formele instemming, is duidelijk dat de (toekomstige) stemgerechtigde leden / aandeelhouders / toezichthouders achter het Buurtenergieplan staan
OV30 Permits have been granted or are enforceable.	Insight in the needed permits, resulting in security that those are obtainable or creates no further risks in the rest of the development	OV30 Vergunningen zijn verleend of afdwingbaar	Inzicht in de benodigde vergunning resulterend in de zekerheid dat het vergunbaar is of geen risico's oplevert in het verdere traject.

OV31 Ground contracts are finalised, including rights in rem (ZRO).	The needed ground contracts (including ZRO) have been mapped, which includes a planning	OV31 Grondovereenkomsten zijn (waaronder ZRO) afgesloten	Grondovereenkomsten benodigd in kaart (waaronder ZRO) met een planning
OV32 Utility services (electricity, gaz, communication) have been contracted.	Insight into the needed utility connections for the chosen heating solutions has been gained and an estimation of the costs.	OV32 Nutsvoorzieningen zijn gecontracteerd	Overzicht van benodigde nutsaansluiting en raming van de kosten
OV40 Regulation authorities (ACM and other competent authorities) agree and have issued the heat supply permit and/or concession.	Choice has been made who will deliver the heat + corresponding heat delivery permit ACM has been started with a check in regards to the criteria and corresponding actions determined and risk analysis.	OV40 Toezichthouders (ACM en andere bevoegde gezagen) zijn akkoord en hebben de warmteleveringsvergunning en/of concessie verleend.	Keuze gemaakt wie warmtelevering gaat doen + navenante warmteleveringsvergunning ACM in gang gezet met check op de criteria, navenante acties bepaald en risico analyse
OV50 The capital requirements of the financiers are in line with the business plan F10.	Size of the EV is clear, it is clear what logical parties are available for that and the first feasibility tests.	OV50 De eisen van de financiers van het eigen vermogen zijn in lijn met het businessplan F10	orde grootte EV is duidelijk, welke logische partijen hiervoor in aanmerking komen en eerste haalbaarheids toets
OV60 The requirements of the financiers of the loan capital have been brought into line with the business plan F10.	Mapped which requirements the financers of the loan capital set	OV60 De eisen van de financiers van het vreemd vermogen zijn in lijn gebracht met het businessplan F10	In kaart gebracht welke de eisen de vreemd vermogen financiers stellen
OV70 Risks according to RT12 are placed with organizations or persons and accepted	Initial risk matrixes has been created in which the existing known risks have been identified.	OV70 Risico's volgens RT12 zijn belegd en geaccepteerd	Eerste risico matrix opgesteld met op dat moment bekende risico geidentifieerd worden
OV80 Entity owner/client are professionally organised and decision making is unequivocal.	Neighbourhood heating company created with a composition needed for the upcoming phases (Development board has been created)	OV 80 Entiteit Eigenaar/opdrachtgever is professioneel georganiseerd en besluitvorming is eenduidig	Buurtwarmtebedrijf opgericht met de voor komende fasen benodigd samenstelling (ontwikkelbestuur samengesteld)
OV91 key positions in the board and personnel have been filled, who all have the right competencies.	Neighbourhood heating company created with a composition needed for the upcoming phases (Development board has been created)	OV91 Sleutelposities in bestuur en personeel zijn ingevuld met de juiste competenties daarin geborgd	Buurtwarmtebedrijf opgericht met de voor komende fasen benodigd samenstelling (ontwikkelbestuur samengesteld)
OV92 Entity Owner/commissioning party has been established and has the, for that purpose developed, processes and means to effectively execute the activities and strategy.	Neighbourhood heating company created with a composition needed for the upcoming phases (Development board has been created)	OV92 Entiteit Eigenaar/opdrachtgever is opgericht en beschikt over de ingerichte processen & middelen om de operatie en strategie effectief uit te voeren	Buurtwarmtebedrijf opgericht met de voor komende fasen benodigd samenstelling (ontwikkelbestuur samengesteld)

Reviewed requirements

Cooperation and Permits		Samenwerking & Vergunningen	
Criteria	**Requirement**	**Criterium**	**Eis**
SV10 Municipality has agreed with the project and its role in it.	The municipality, specifically the responsible alderman, verbally agrees with the Neighbourhood energy plan. Municipality can still have some reservations in regard to formal decision making (Energy source strategy/environmental plans/transition vision). The municipality has decided on how they will approach the given director role in regard to the project and the chosen role within it.	SV10 Gemeente is akkoord met het project en haar rol daarbinnen	De gemeente stemt bij monde van de betrokken wethouder in met het Buurtenergieplan. Gemeente kan nog voorbehoud hebben t.a.v. formele besluitvorming (Bronnenstrategie/omgevingsplan/transitievisie). De gemeente heeft bepaald hoe haar regierol inhoud geeft in relatie tot het project en haar rol daarbinnen.
SV11 Social housing corporations and/or business real estate owners have agreed with the project and their role in it.	Social housing corporations and/or business real estate owners have been involved in the development of the Neighbourhood energy plan and agree with its content. Their further role in the project development phase has also been decided.	SV11 Woningcorporatie en/of Zakelijke vastgoedeigenaren zijn akkoord met het project en haar rol daarbinnen	Woningcorporatie en/of Zakelijke vastgoedeigenaren zijn betrokken geweest bij het maken van het buurtenergie plan en stemmen daarmee in. Ook is bepaald of zij een rol zullen spelen in de project ontwikkelfase
SV20 Permits RT40 have been granted or are enforceable.	Insight into the needed permits has been gained to give certainty that those can be obtained or that there are no further risks in the rest of the development.	SV20 Vergunningen RT40 zijn verleend of afdwingbaar	Inzicht in de benodigde vergunningen resulterend in de zekerheid dat het vergunbaar is of geen risico's oplevert in het verdere traject.
SV30 Ground contracts RT40 are finalised, including rights in rem (ZRO).	The needed ground contracts (including ZRO) have been mapped, which includes a planning	SV30 Grondovereenkomsten RT40 zijn (waaronder ZRO) afgesloten.	Grondovereenkomsten benodigd in kaart (waaronder ZRO) met een planning
SV42 Utility services RT40 have been contracted by the exploitation company OF20.	Insight into the needed utility connections for the chosen heating solutions has been gained.	SV40 Nutsvoorzieningen RT40 zijn gecontracteerd door exploitatiebv OF20	Inzicht in de benodigde nutsaansluiting passend bij de warmteoplossing
SV50 Regulation authorities (ACM and other competent authorities) agree and have issued the heat supply permit and/or concession	Citizens collective has orientated itself in regard to the question if they want to hold their own heat delivery permit or if cooperation with a partner is desired for that.	SV50 Toezichthouders (ACM en andere bevoegde gezagen) zijn akkoord en hebben de warmteleveringsvergunning en/of concessie verleend.	Bewonerscollectief heeft zich georienteerd op de vraag of zij zelf een warmteleveringsvergunning willen aanvragen of dat ze daarvoor samen willen werken met een partner.
SV60 Risks according to RT12 are placed with organizations or persons and accepted	Initial risk matrixes has been created in which the existing known risks have been identified.	SV60 Risico's volgens RT12 zijn belegd en geaccepteerd.	Eerste risico matrix opgesteld waarin op dat moment bekende risico zijn geïdentificeerd
SV70 Networkoperators have agreed to the project planning RT80.	Networkoperators have been involved in the making of the Neighbourhood energy plan and have considered the impact of it on the network infrastructure under their control.	SV70 Netbeheerder is akkoord met de projectplanning RT80.	Netbeheerder zijn betrokken geweest bij het maken van het buurtenergie plan en hebben de impact van de netwerkinfrastructuur bepaald.

SV80 The capital requirements of the non-resident financiers are in line with the business plan OF40.	Potential non-resident financers for the own capital have been identified.	SV80 De eisen van de financiers van het eigen vermogen niet zijnde de bewoners B80 zijn in lijn met het businessplan OF40	Potentiële eigen vermogen financiers zijn in beeld

Appendix B:

Appendix B.1: Explanation behind the guidance pictures

The guidance pictures were created to inspire reaction from the municipalities and initiatives and to help guide the conversation during the interviews. The information presented within the figures is mainly based on the experiences of Buurtwarmte, and is therefor based on notes from meetings with initiatives, information provided to initiatives during presentations and the personal experiences of my supervisor within Buurtwarmte.

For the public values presented in Figure 7 on page 41, many of the shown values were taken from a research into the public values within a municipality and in a hospital, conducted by the Free university of Amsterdam (de Graaf, Huberts, & Smulders, 2013). Some additional values were added to, in the opinion of the researchers, more accurately represent the situation within the heat transition.

Dutch originals

Figure 5: Guidance picture 1: Challenges for municipalities within their interactions with local energy initiatives (Dutch)

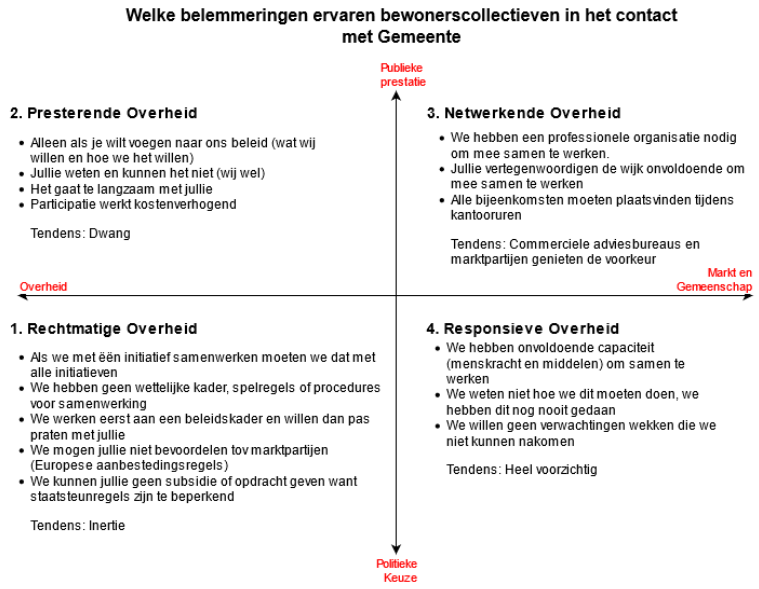

Figure 6: Guidance picture 2: Limitations experienced by local energy initiatives in their interaction with municipalities (Dutch)

Figure 7: Guidance picture 3: Public values that play a role in the choice of municipal role (Dutch)

English

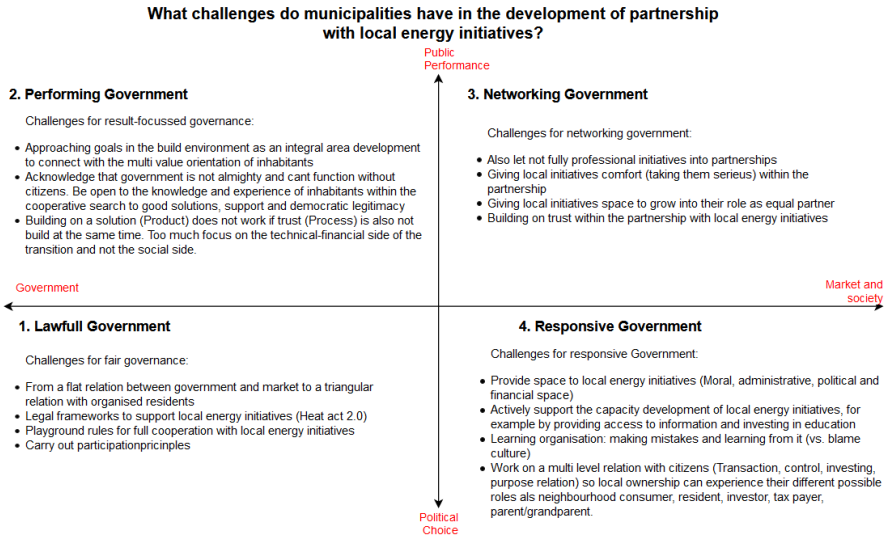

Figure 8: Guidance picture 1: Challenges for municipalities within their interactions with local energy initiatives (English)

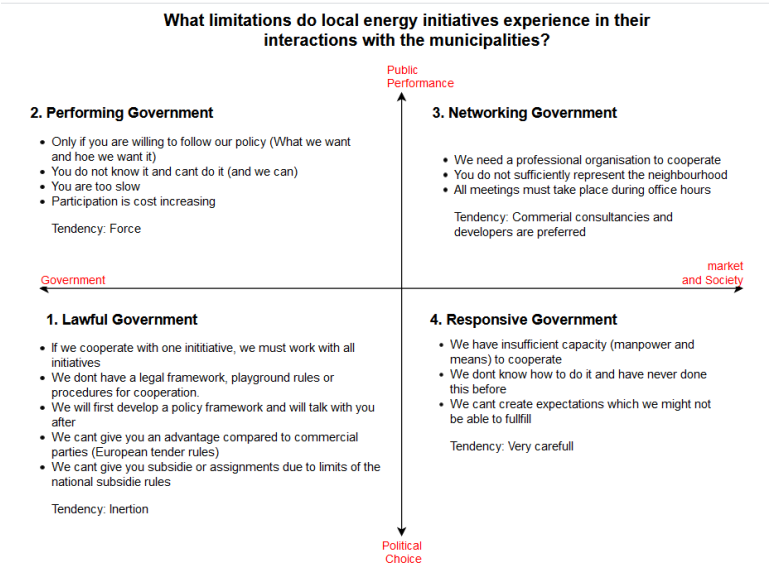

Figure 9: Guidance picture 2: Limitations experienced by local energy initiatives in their interaction with municipalities (English)

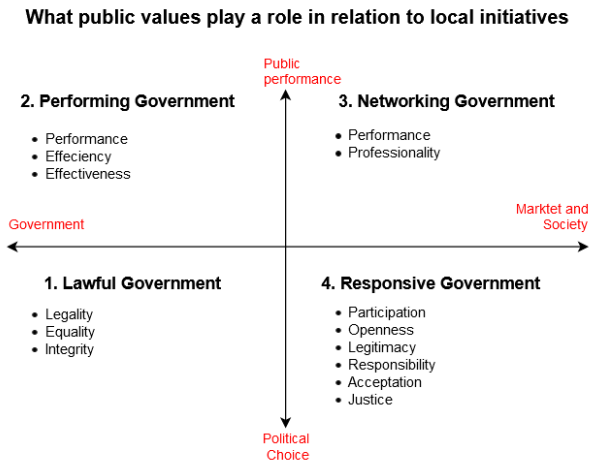

Figure 10: Guidance picture 3: Public values that play a role in the choice of municipal role (English(

Appendix B.2: Interview scheme:

In this section the guiding topics and questions of the semi-structured interviews are shown. It was done using the pictures presented in Appendix B.1 in order to get people talking more freely. Due to the difference in position, the exact questions were asked slightly different between interviews with municipal staff and members involved in local energy initiatives. Your municipality can either refer to the municipality which employs the interviewee or the municipality with which the initiatives have the most contact.

The goal was to cover each topic within the scheme. During the interview, it occurred that within the answer to one question, the answer on another question was also given, meaning not all questions were directly asked in every interview, however the answers to almost every questions was given during the interviews.

Introduction:

How are you personally involved in the heat transition?

What are your experiences with local energy initiatives?

What are your experiences with municipalities regarding the energy transition?

Role division:

Is it clear what each of the four roles are?

What role(s) do you personally recognise of these four?

What role(s) has your municipality chosen within the energy transition?

How would you exactly describe the position of the municipality?

Is your municipality involved with local energy initiatives?

How is your municipality involved in local energy initiatives?

Challenges guidance picture:

Are there challenges with municipalities/initiatives you directly recognise from your own work within the energy transition?

Are there challenges with municipalities/initiatives you have experienced that are not included within any of the roles?

Are there challenges with municipalities/initiatives that are currently being worked on within your municipality?

Hinderances guidance picture:

Are there hindrances with municipalities/initiatives you directly recognise from your own work within the energy transition?

Are there hindrances with municipalities/initiatives you have experienced that are not included within any of the roles?

Are there hindrances with municipalities/initiatives that are currently being worked on within your municipality?

Are there hindrances with municipalities/initiatives that you view as unsolvable, meaning they are likely going to be a hindrance for a long time?

Guidance picture Hinderances - Tendencies:

Do you feel the tendencies linked to the hindrances accurately represent the direction municipalities would take?

Have you experienced some of these tendencies within your activities?

Guidance picture Values:

Are there values behind the choice of role that play an important part in your activities?

What values play an important role within the decision making of your municipality?

Are there values that are currently placed at specific roles that would also fit at other roles?

Are there values that play an important role in your activities that you don't recognise in the values present with the picture?

Guidance pictures in general:

Do you feel like these pictures could be used to give initiatives more insight in the position of municipalities within the energy transition?

Appendix C. Overview of municipal roles from literature

Due to a large variety of definitions of the different roles, two overview tables were made linked to the role definition by Driessen, et al. (2019). The placement is based on where a role fits the best, meaning some smaller elements of the definition might not fit perfectly with the definition of Driessen, et al. Due to the large amount of literature sources, it has been split into two tables for readability.

Each role is given by the English translation of the used term with the original Dutch term within the brackets, with a short description below it.

Table 7: Part 1 of the overview of the different municipal roles definitions compared to the roles defined by Driessen, et al. (2019)

Adapted from Driesen et al. (2019)	Adapted from Van Gerwen, et al. (2014)	Adapted from TNO, Platfrom_31, G4 (2020)	Adapted from Schulz et al. (2013)	Adapted from Ebskamp & Verbraak (2019)
Regulating -Government regulates intervention, so initiatives, coordinates and decides	**Performing (Presterende)** -setting goals and reach those goals most effectively.	**Directing (Besturen)** -Municipality take control and responsibility over process and product.	**Taking over (Overnemen)** -Municipality takes over the process and risks	**Forcing (Dwinger)** -municipality forces their viewpoint on any party or plan in regard the energy transition.
Network steering -Government (co) initiates and creates network of stakeholders, while coordination decision making	**Networking (Netwerkende)** -Government creates link between partners, but remains in the lead.		**Cooperation (Samenwerken)** -municipality does not need to everything themselves but work together with partners.	**Director (Regisseur)** -Municipality cooperates with partners to allow them access to the energy transition with a mutually agreed upon solution.
Stimulating -Government actively stimulates the initiation and continuation of initiatives, but initiatives decide on their own	**Lawful + participating (Rechtmatige + Participerende)** -Government provides some kind of support but stays outside of the decision making and sticks to legal required areas.	**Navigating (Navigeren)** -municipality provides subsidies while guiding the process and setting the borders.	**Connecting (Verbinden)** -Municipality connects parties but is no further involved. **Provoking (Uitlokken)**	**Connector (Verbinder)** -The municipality connects different parties together, who then work together on the energy transition without the direct involvement of the municipality.

			-municipality tries to provoke initiatives to take action.	
Facilitating/enabling -Initiatives initiate themselves and government has an interest of making them happen	**Participating (Participerende)** -Government stays back and provides support when needed.	**Laveren** **-**Municipality provides financial support for initiatives determining the process and the product.	**Advising (Adviseren)** -municipality advises the initiative on a possible course of action.	**Executor (Uitvoerder)** -municipality wants to ensure the protection of an essential function of its area so takes control over the conditions which partners need to meet. **Facilitator (Facilitator)** -Municipality wants local inhabitants to take the responsibility and sets the conditions but will help out as well with knowledge or subsidy.
Letting go -Initiatives are self-initiated, self-coordinated and self-governed without any government involvement**.**	**Lawful (Rechtmatige)** -Only involved with the legally required areas; permits.		**No role (Geen rol)** -Municipality is not involved in the initiative. **Facilitating (Faciliteren)** -municipality sets the conditions for initiatives to operate within.	**Awaiting (Afwachter)** -Municipality only does their legal duties and moving everything else to the future.

Table 8: Part 2 of the overview of the different municipal roles definitions compared to the roles defined by Driessen, et al. (2019)

Adapted from Driesen et al. (2019)	Adapted from Participatiecoalitie Noord- holland (2021)	Adapted from KaapZ (2019)	Adapted from Rebel (2019)
Regulating -Government regulates intervention, so initiatives, coordinates and decides	**Directing (Sturende)** -Municipality develops the initiatives and gains knowledge	**Owner (Eigenaar)** -full control and ownership over the final product. (F.e. a heat supply company) **Tenderer (Aanbesteder)** -Municipality makes a well regulated decision between the possible commercial partners to run the heat supply company.	**Ownership (Eigenaarschap)** -Taking a large amount of control and responsibility for any heat supply systems.
Network steering -Government (co) initiates and creates network of stakeholders, while coordination decision making	-	**Partner** -cooperation with a trusted partner to develop and gain ownership over the heat supply solution.	**Cooperating (Samenwerken)** -Coming from own policy goals cooperate with other parties.
Stimulating -Government actively stimulates the initiation and continuation of initiatives, but initiatives decide on their own	**Cooperating (Samenwerken)** -Municipality provides their assets and knowledge to initiatives to motivate others to engage or follow their example.		**Stimulating (Stimulerend)** -Using guarantees and subsidies to support initiatives
Facilitating/enabling -Initiatives initiate themselves and government has an interest of making them happen	**Faciliating (Faciliteren)** -Set conditions and help the involved parties. If there is already a number of initiatives active, can also function as a connector.		**Facilitating (Faciliterend)** -Make use of the initiatives. Guide those and ensure they meet the legal requirements.
Letting go -Initiatives are self-initiated, self-coordinated and self-governed	-	**Facilitator (Facilitator)**	-

without any government involvement.		-Provide space to initiatives to develop within the conditions set by the municipality.	

(Resink & Spaans, 2019)

(Ebskamp & Verbraak, 2019)

(van Gerwen, Hajer, Kruitwagen, van der Steen, & Scherpenisse, 2014)

(Driessen, Hegger, Mees, & Uittenbroek, 2019)

(TNO, Platform_31, & G4, 2020)

(Schulz, van der Steen, & van Twist, 2013)

(Participatiecoalitie Noord-Holland, 2021)

(Rebel, 2019)