

Stakeholder Engagement for a Local Energy Community in Energy Transition— Case of De Heuvel/Amstelwijk

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Date: 3rd June 2023

This is for year one report of part of the project “Optimizing the design and operation of Local Energy Systems for neighbourhoods with high self-sufficiency and high actor engagement” with project number 482.20.608 of the research programme The Merian Fund which is financed by the Dutch Research Council (NWO).

Summary

The goal of a local energy community (LEC) is to create a more sustainable, resilient, and efficient energy system by reducing dependence on centralized power sources and enabling greater participation and control by local communities and individuals. LEC requires transformations in local energy systems, and strongly depends on the preferences and actions of the local actors involved. The necessity for extensive stakeholder involvement adds complexity to the energy transition, posing a significant challenge for all involved parties.

The municipality of Leidschendam-Voorburg has committed to the national decision for energy transition. It has taken a strategic approach by proceeding De Heuvel/Amstelwijk as the pioneer in this initiative, leading the way for other neighborhoods to follow. It is crucial to devise strategies that effectively facilitate stakeholder engagement. To this end, a thorough stakeholder analysis is needed. Such an analysis can focus on the identification of key stakeholders, their interests, their influence, and their behavioral characteristics in relation to the energy transition. Additionally, it's crucial to uncover the challenges encountered by these stakeholders and finally develop appropriate strategies to address them hence enhance their engagement.

This thesis begins with an introduction to the research background, including a presentation of the case study and a statement of the problem identified in the field, followed by the research questions underpinning the study. A thorough literature review ensues, providing a robust synthesis of existing research relating to stakeholder engagement in LECs, with a view to expediting energy transitions. The literature review not only forms the foundation for the research methods adopted in this study but also promotes in the construction of the conceptual model. Subsequent to the literature review, the research method is detailed. The field research is conducted in five steps: Step 1 - identification of stakeholders, Step 2 - prioritization of stakeholders, Step 3 - interviewing, Step 4 - data analysis, including stakeholder profiling with mapping and addressing challenges, and finally, Step 5 - proposal of strategies for stakeholder engagement enhancement based on the expected and current levels of stakeholders engagement. This research collects necessary information to understand the profiles of stakeholders in De Heuvel/Amstelwijk, tackle challenges faced by different stakeholders, propose strategies to increase stakeholders engagement. It not only aims to enrich the depth of theoretical knowledge on the subject matter but also strives to aid in the development of a localized energy strategy that is optimally suited for the De Heuvel/Amstelwijk neighborhood as good example for other neighborhoods.

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1. Introduction

Sustainable energy transition aims to develop low-carbon, reliable, secure and affordable energy systems. A substantial part of the sustainable energy transition takes place at the local level (i.e., neighbourhood or block level). It demands transformations in local energy systems, and strongly depends on the preferences and actions of the local actors involved, such as households, local businesses. A local energy community (LEC) aims for generating, distributing, and consuming energy within a defined geographical area, such as a city, town, or neighbourhood. The goal is to create a more sustainable, resilient, and efficient energy system by reducing dependence on centralized power sources and enabling greater participation and control by local communities and individuals. LEC can take advantage of decentralized renewable resources and can lead to, e.g., increased reliability, flexibility, resilience, and security of supply of the energy system. Moreover new business models emerge around peer-to-peer energy services. These models are revolutionizing the way energy is bought, sold, and distributed, promoting localized energy transactions, and encouraging a shift towards a more decentralized and efficient energy grid system. However, there are some social challenges within LECs due to the complexity of the large number of various stakeholders. Different interests and motivations of different stakeholders and the complex interactions between these stakeholders when cooperating and competing make a successful LEC challenging and energy transition challenging. This research aims to investigate characteristics of different stakeholders, reveal the differences and difficulties which hinder energy transition, and finally find collective solutions to easier energy transition in a LEC.

This introductory chapter starts with an description on the case of De Heuvel/Amstelwijk, offering necessary background information (section 1.1). The problem statement is then explained (section 1.2), thereby shows the pragmatic motivation for the study. Finally, in accordance with these elements, the research questions are delineated (section 1.3), thus setting out the directions and scope of the study.

1.1 Case of De Heuvel/Amstelwijk

The Netherlands, in alignment with the 2015 Paris Climate Agreement, aims to reduce greenhouse gases in the Netherlands: 49 per cent fewer emissions in 2030, relative to 1990, and a carbon-neutral energy system in 2050. This emission reduction will significantly affect Dutch citizens and businesses, requiring decisions about lifestyle and economic activities. Over 100 parties have collaborated since 2018 to achieve this, leading to the National Climate Agreement. The Climate Agreement presented in June 2019—a broad-based societal package supported by contributing parties to reach the 2030 target (*The Climate Agreement*, n.d.).

To respond Paris Climate Agreement (2015) and the national Climate Agreement (2019), Local Energy Strategy of Leidschendam-Voorburg has been made to achieve being CO₂ neutral by 2050 (Het college Leidschendam-Voorburg, 2020). In municipality's strategy plan it is decided to take actions with neighborhood per neighborhood and De Heuvel/Amstelwijk is chosen to be the first neighborhood (Gugten & Dane, 2021). The following figure shows the geographic location of Leidschendam-Voorburg and De Heuvel/Amstelwijk.

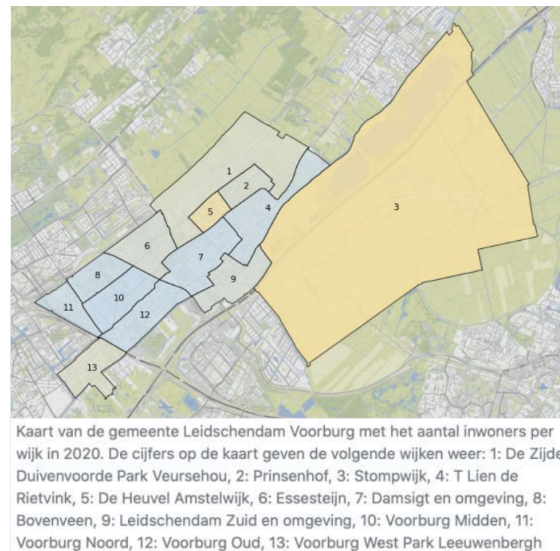


Figure 1: Geographic location of Leidschendam-Voorburg¹ and De Heuvel/Amstelwijk²

The reasons fall under various folds. In De Heuvel/Amstelwijk the existing renovation plans can be linked easily with the Vidomes and WoonInvest housing corporations. That makes it a lot easier to immediately make an entire neighborhood natural gas-free. In addition, there are many flats in De Heuvel/Amstelwijk that are similar in construction. This makes it easier to use one suitable sustainable energy solution. Moreover, De Heuvel/Amstelwijk is located near an aqua thermal source that is reliable and clean. The subsequent matrix presents an analysis conducted by the municipality. This neighborhood De Heuvel/Amstelwijk, having the most checked boxes, has been selected as the first area for energy transition.

¹ <https://en.wikipedia.org/wiki/Leidschendam-Voorburg>

(Leidschendam-Voorburg is a municipality in the western Netherlands, located in the province of South Holland. It had a population of 76,433 in 2021, and covers an area of 35.62 km² of which 3.07 km² is water.)

² <https://kadastralekaart.com/wijken/de-heuvel--amstelwijk-WK191606>

(De Heuvel / Amstelwijk has a total of 3,135 inhabitants and 1,755 households. With a total area of 40 hectares, De Heuvel / Amstelwijk is one of the smallest neighbourhoods in the Netherlands.)

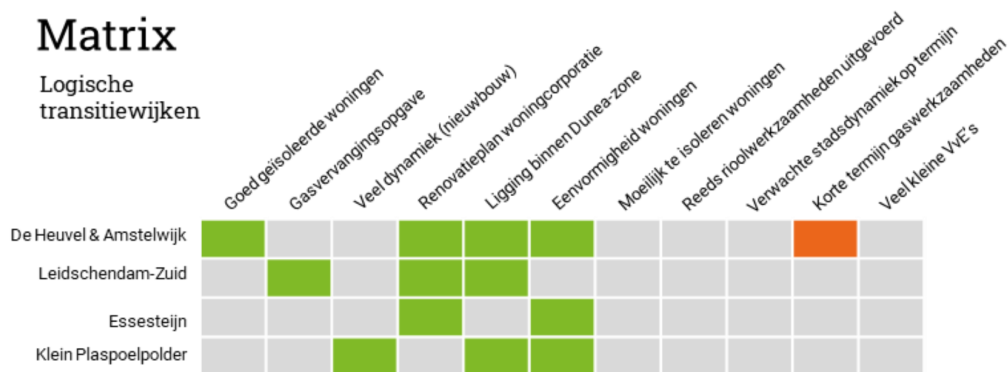


Figure 2: Matrix of logical transition neighborhoods

In addition, the subsequent visual presents the residential landscape within the neighborhood De Heuvel/Amstelwijk.

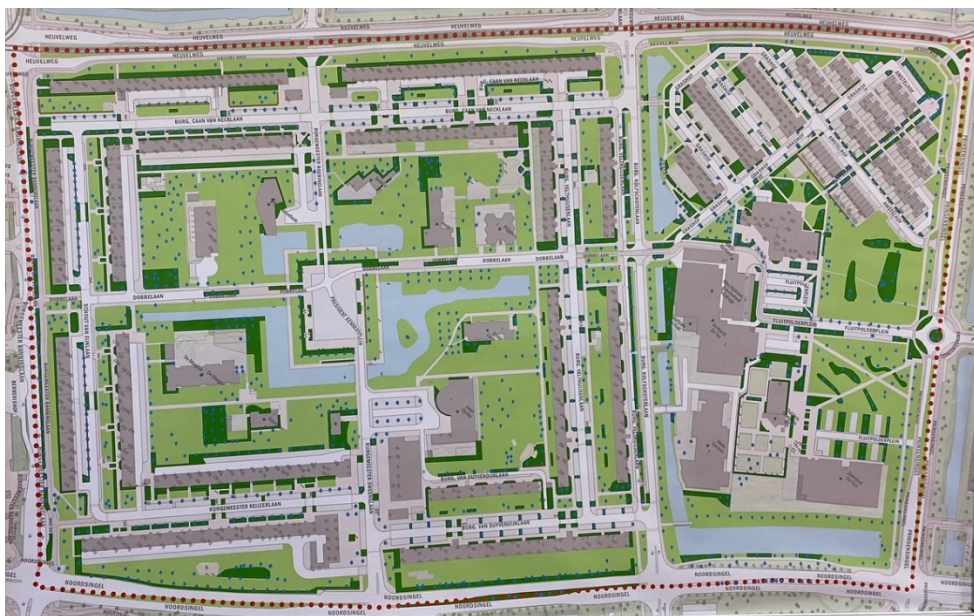


Figure 3: Residential landscape of De Heuvel/Amstelwijk

According to statistics of year 2022³, the number of dwellings in De Heuvel/Amstelwijk, with a total of 1,794, which 95% are occupied. 57% of the dwellings are zoned as rental and 43% are owner-occupied. There are 40 nationalities in the neighborhood De Heuvel/Amstelwijk and as seen in the following figure that there are 46% social housing, 43% private owned and 11% private rented property types, where the citizens are with more non-Dutch nationalities⁴. The complexity of the neighborhood including physical environment and social environment make it challenging to fasten energy transition.

³ <https://kadastralekaart.com/wijken/de-heuvel--amstelwijk-WK191606>

⁴ <https://allecijfers.nl/wijk/de-heuvel-amstelwijk-leidschendam-voorburch/>

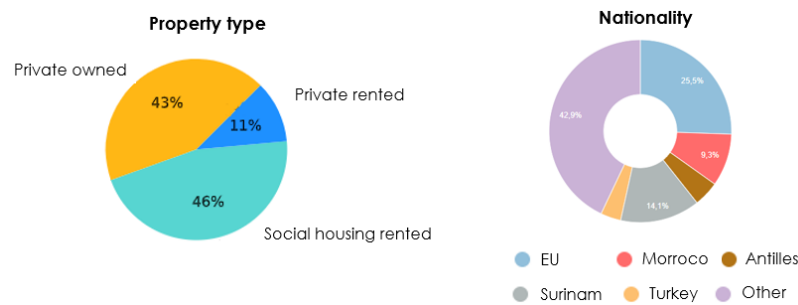


Figure 4: Property type and nationality of De Heuvel/Amstelvijk

1.2 Problem Statement

The municipality of Leidschendam-Voorburg has committed to the national decision to phase out natural gas. However, the responsibility of implementing this decision has fallen upon the residents and the municipal authority themselves. This has led to a decentralized process where all relevant stakeholders are tasked with the responsibility of determining the best course of sustainability measures for their properties. The necessity for extensive stakeholder involvement adds complexity to the energy transition, posing a significant challenge for all involved parties.

The consequences of such a decentralized approach are manifold. To facilitate the transition, the municipality has implemented subsidies to make the shift financially manageable for energy users. However, these measures have proven insufficient to galvanize complete public participation. Numerous barriers impede the energy transition, such as gaps in knowledge and understanding of the process, conflicting interests and preferences among stakeholders, and challenges that extend beyond technological and financial constraints.

Recognizing the urgency of the situation, the municipality of Leidschendam-Voorburg is actively seeking solutions to facilitate stakeholder engagement in the energy transition process. The author, along with her research team, decided to assist the municipality in investigating this issue. To this end, a thorough stakeholder analysis is imperative. Such an analysis can focus on the identification of key stakeholders, their interests, their influence, and their behavioral characteristics in relation to the energy transition. Additionally, it's crucial to uncover the unique challenges encountered by these stakeholders and devise appropriate strategies to address them hence enhance their engagement.

1.3 Research questions

This research focuses on the stakeholders within the energy transition of De Heuvel/Amstelvijk in the municipality of Leidschendam-Voorburg, with its aim of developing the best local energy strategy for this district. This research is in line with the municipality's plan to make De Heuvel/Amstelvijk free of natural gas by 2030. Community participation and local ownership

are recently recognized as important perspectives from LECs for a successful energy transition (Hasanov & Zuidema, 2018). Hence, the initial step involves comprehending the characteristics of various stakeholders of the LEC in order to foster alignment, participation, engagement, and ultimately, local ownership. This research collects necessary information to understand the profiles of stakeholders in De Heuvel/Amstelveen, tackle challenges faced by different stakeholders, and finally develop appropriate strategies to address them hence enhance their engagement. Research questions are illustrated in the following:

1.3.1 Central research question

How to improve engagement for all relevant stakeholders in a local energy community to facilitate a smooth energy transition? - Case of De Heuvel/Amstelveen

1.3.2 Sub research questions

1. What are the important factors for stakeholders profiling to enhance stakeholder engagement? (theoretical question)
2. Who are the relevant stakeholders in a LEC with the case of De Heuvel/Amstelveen? (theoretical and practical question)
3. What are the characteristics of all relevant stakeholders in a LEC with the case of De Heuvel/Amstelveen? (practical question)
4. What are the challenges of stakeholders in a LEC hinder engagement for energy transition? (practical question)
5. How to tackle challenges and improve the engagement based on various characteristics of stakeholders? (practical question)

2. Literature Review

The literature review provides a comprehensive examination of existing research related to stakeholder engagement in LECs with the purpose of accelerating energy transitions. First, literature related to this topic is reviewed and synthesized to provide profound understanding and valuable insights into how stakeholder engagement can be enhanced (section 2.1), this specifically addresses the first sub research question: “*What are the important factors for stakeholders profiling to enhance stakeholder engagement? (theoretical question)*”. Moreover, a comprehensive literature review concerning the various types of stakeholders in LECs is presented (section 2.2). This serves as a solid foundational understanding of stakeholders, which is essential for identifying and defining the stakeholders involved in the De Heuvel/Amstelveen case study for this research. The literature review also provides foundation of research methods (section 2.3) which are adapted in this study, specifically explained in section 3. Through this review, research gaps will also be identified and how this study filling

the gaps through both theoretical and practical research will be clarified (section 2.4). Finally, a conceptual model will be developed integrating key findings from the literature review (section 2.5), explain the relationship between various factors influencing engagement, and provide a theoretical framework for this study.

2.1 Stakeholders engagement

2.1.1 Definition of stakeholders engagement

Stakeholders are investigated mostly in firms, organizations for business and management. The knowledge and methods regarding stakeholder management is relevant and can be learnt to be adapted in stakeholders in the context of energy transition. A stakeholder is ‘any group or individual who can effect or is affected by the achievement of the organization’s objectives’ (Freeman, 1984:46). In Freeman’s stakeholder theory, distribute important decision-making power to stakeholders is one important claim, he argued that stakeholders must participate in determining the future direction of the organization in which they have a stake.

Stakeholder management, as an extension of this concept, refers to the systematic process of *identifying, understanding, and managing the relationships and interests* of these diverse groups to achieve mutually beneficial outcomes (Freeman, 1984; Bryson, 2004). Stakeholder inclusion, involvement, participation, and engagement are closely related concepts, often been discussed together, that describe the varying degrees of interaction between stakeholders. Stakeholder inclusion has been studied and it generally refers to include the stakeholders in the process and provide information to stakeholders (Mitchell et al., 2015; Godenhjelm & Johanson, 2018), or include stakeholders information e.g., knowledge and perspective (Klopprogge & Sluijs, 2006). This is rather passive involvement of stakeholders that the communication is not mutual and equal. While stakeholder participation or active involvement implies a more active role where stakeholders have the opportunity to influence decisions. Various participatory research has been done for how to encourage citizens to actively participate in the concept of energy transition (Bayley & French, 2008; Correa-Florez et al., 2020, 2020). Stakeholder engagement, on the other hand, encompasses a range of activities that facilitate collaboration, dialogue, and decision-making processes between stakeholders (Reed, 2008; Alvial-Palavicino et al., 2011; Correia Loureiro et al., 2020; Ferreira et al., 2020; Loureiro et al., 2020; Lange & Cummins, 2021), which is very high level of involvement and stakeholders are expected with a proactive approach. It appears that to attain engagement, inclusion, participation of stakeholders must be reached first. The following diagram illustrates the logical progression towards stakeholder engagement.

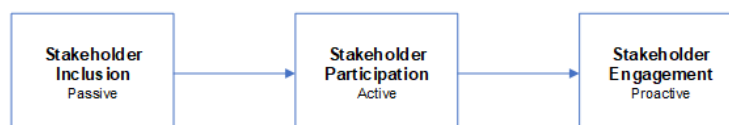


Figure 5: Stakeholder inclusion, participation and engagement

2.1.2 Importance of stakeholders engagement

Stakeholder engagement continues to be a vital aspect of successful project execution. Active participation from diverse stakeholders ensures a broad spectrum of perspectives, enhancing the decision-making process and leading to more comprehensive and effective strategies. Each stakeholder, driven by their unique profiles, is needed to collaborate with others to strengthen a flexible, resilient and self-sustained collective community (Correia Loureiro et al., 2020). Higher levels of stakeholder engagement tend to yield more positive outcomes and longer term success in the community. When stakeholders are more engaged, they develop a greater sense of ownership and responsibility for the success of the LEC (Walker et al., 2021), consequently raise a collective drive towards sustainable energy transitions (Heuninckx et al., 2022). Stakeholder engagement fosters social learning and cognitive shifts, particularly beneficial for tackling intricate and substantial environmental issues. Ultimately, stakeholder engagement catalyzes behavioral change, evolving from individual changes to transformations within communities (Eaton et al., 2021).

Recent studies emphasize the potential of policy interventions in encouraging stakeholder engagement. Incentive-based policies can significantly foster such stakeholder involvement in energy communities to increase energy efficiency (Gillingham et al., 2009; Linares & Labandeira, 2010). However, when there is a need for a higher level of commitment, merely nudging may not be enough (Bhargava & Loewenstein, 2015). In such instances, non-price interventions could play a crucial role in amplifying effectiveness (Andor & Fels, 2018). An in-depth exploration of various factors, particularly the behavioral mechanisms among stakeholders, is essential for gaining a more profound understanding of these stakeholders. This knowledge is crucial for the development of suitable strategies that enhance their engagement.

2.1.2 Important factors of stakeholders engagement

Stakeholder engagement is mostly researched in business and management area which is rather practical than theoretical. Nevertheless, the expertise gathered in practical applications can also be employed to enhance understating stakeholders in a LEC. Literature search and review provides the key behavioral factors summarized below. These factors will be taken into consideration while constructing the conceptual model and determining stakeholders' profile of their characteristics. These factors will also guide the design of the interview questions.

2.1.2.1 Objectives

Understanding the **objectives** of different stakeholders is crucial as it forms the foundational step in setting goals aimed at accomplishment. Relevant stakeholders may have different objectives when joining a LEC, which can sometimes lead to conflicts due to disparate interests and goals. It's essential to understand and manage these differences effectively to maintain harmony and progress towards common community objectives. Moreover, stakeholders objectives can influence their decision to contribute and participate actively in the community. Therefore, each stakeholder within the LEC should have a clearly defined role, with their objectives being intrinsically tied to this role (Heuninckx et al., 2022). Finally, aligning stakeholders with collective objectives within a community is crucial for fostering a shared

vision and driving collaboration towards common goals, which ultimately improves engagement and efficiency for the community's long-term success (Walker et al., 2021).

2.1.2.2 Interest and influence

Initially, the concepts of '**interest**' and '**influence**' for stakeholder analysis were established in the context of natural resource management (Grimble & Wellard, 1997). Here, 'interests' refers to an economic construct that indicates the level of utility or welfare perceived by stakeholders. A system for classifying stakeholders according to importance (interest level) and influence (power level) was developed in the same study of Grimble & Wellard (1997), where 'importance' relates to stakeholders whose interests are prioritized in facilitate initiatives, while 'influence' relates to the degree of control certain stakeholders have over the success of a project. To evaluate the merit or worth of a particular intervention or policy, it is important to understand these differential effects. Many stakeholder management studies adopted this for stakeholder analysis for stakeholder engagement (Olander & Landin, 2005; Reed et al., 2009; Walker & Devine-Wright, 2008), the detailed are explained in the literature review section 2.2 regarding stakeholder analysis method.

2.1.2.3 Knowledge

Involving stakeholders in decision-making processes concerning intricate environmental issues has been a long-standing practice, and stakeholder **knowledge** is an key attribute that underpins engagement which has been studied a lot (Klopprogge & Sluijs, 2006; Klenk et al., 2015; Bourne, 2016; Godenhjelm & Johanson, 2018; Reed et al., 2018). Stakeholders' knowledge including observation, reasoning, and perspective can be beneficial when tackling complex problems. Moreover, the unique knowledge possessed by stakeholders can introduce important fresh views on the problem and provide relevant information regarding the issue at hand (Reed et al., 2018). To strengthen the knowledge at a community level, a variety of knowledge-sharing and social-learning platforms are needed for a network to raise social robustness (Klenk et al., 2015; Godenhjelm & Johanson, 2018).

2.1.2.4 Intention, agency and action

"Climate change needs behavior change", it says all in the title of work of (Williamson et al., 2018). Understanding the behavioral characteristics of stakeholders is a crucial aspect, particularly with the aim of steering their actions towards achieving collective goals. In his book "Thinking, Fast and Slow" (Kahneman, 2011) his work Prospect Theory (Kahneman & Tversky, 2013), Daniel Kahneman has significantly influenced the fields of psychology, social science, and behavioral economics. His research highlights the concept of bounded rationality, proposing that individuals' decision-making processes are contingent upon their psychological predispositions. Kahneman's work underlines that humans often make decisions that deviate from rationality in complex and nuanced ways. Therefore simply incentive based economics principle is not adequate to change human's behavior, as it overlooks the complex psychological factors and cognitive biases that significantly influence decision-making processes. Other alternatives for example nudging is an emerging strategy to change civic behavior (John et al., 2009), as educating individuals about the advantages of change allows

them to make decisions they perceive to be in their best interest, as opposed to feeling compelled to change due to external pressures (Arcanjo, 2020a).

To comprehensively investigate stakeholder behavior, it is crucial to include certain behavioral factors such as intention, action, and agency. Behavior change models adapted from classic Theory of Reasoned Action (Fishbein, 1979) and the extension: Theory of Planned Behavior (Ajzen, 1991) posit that **intention** as an individual's readiness to perform a specific behavior or **action**. Intention represents a commitment to act and is often the strongest predictor of behavior. While intention paves the way for potential action, **agency** plays a pivotal role in translating intention into action. Agency, sometimes referred to as perceived behavioral control or self-efficacy, which is the belief in their capacity to execute behaviors necessary to produce specific performance attainments. If individuals believe they have the ability (agency) to perform the behavior and the control over the factors that influence it, they are more likely to act on their intentions (Bandura, 1982).

2.1.2.5 Communication

Communication is the key to enhance stakeholder engagement (Bourne, 2016). It's widely recognized that establishing trust and robust relationships among stakeholders is crucial for effective stakeholder engagement, as it is fundamental to ensuring the smooth execution and long-term success of a project (Wolsink, 2012; Steg et al., 2015; Boschetti et al., 2016). Open, clear, and regular communication aids in fostering understanding, mitigating potential conflicts, and aligning goals and expectations, therefore building trust. We posit that communication is not merely an important factor, but rather a central medium, support and enhance stakeholder engagement. As such, significant attention for communication strategy needs to be paid in developing solutions to improve stakeholder engagement (refer to section 4.3.2). Firstly, knowledge brokers who act as connecting information, knowledge to relevant stakeholders are particular important for effective communication (Godenhjelm & Johanson, 2018). Moreover, communication strategies, whether they employ a top-down or bottom-up approach, one-way or two-way interactions, must be thoughtfully designed to fit the specific context and people involved (Reed et al., 2018).

2.1.3 Challenges of stakeholder engagement

However community itself is not a homogenous being and can have its own tensions around vision; understanding in dynamics could be challenging due to the *complexity* from various aspects (Fischhendler et al., 2021). The behavior of stakeholders is greatly influenced by contextual factors associated with their environment (Steg et al., 2015). The contextual factors can include a wide range of elements, such as cultural norms, societal trends, economic conditions, organizational structures, political climate, physical environment, and available technology, among others. These contextual factors define the costs and benefits of different energy behaviors, such as prices, time, comfort, externalities for the society and environment (Perlaviciute & Steg, 2014). Stakeholders therefore may differ in their decision-making processes, influenced by their unique contextual factors.

One of the most prevalent challenges in stakeholder engagement is *communication barriers* (Fulton et al., 2013; Miller et al., 2020; Lange & Cummins, 2021; Agyekum et al., 2022). Language, technical jargon, and differences in perspective can hinder the flow of information and impede understanding therefore *mistrust* (Miller et al., 2020). Mistrust can trigger emotions that affect decision-making processes, thereby posing a challenge to effective stakeholder engagement (Fulton et al., 2013; Sloan & Oliver, 2013). Miscommunication and mistrust can be especially problematic when engaging stakeholders with varied backgrounds including different nationalities, different languages and different professional backgrounds (Boschetti et al., 2016).

Additionally, understanding and managing *conflicting interests* is a substantial challenge (Agyekum et al., 2022; Bahadorestani et al., 2020). Individuals often have their own objectives driven by unique motivations and priorities, which may not necessarily align with the collective goals of the community or the interests of other stakeholders within the same community (Freeman, 1984). Stakeholder interest emerges from a variety of expectations and values related to the project objective. When there is a mismatch between these, stakeholders might start questioning "What's in it for me?" which potentially leads to disengagement (Eskerod & Larsen, 2018). A LEC's success relies heavily on the ability to find common ground and collaboratively create mutually beneficial solutions.

Lack of knowledge is another significant issue, often resulting in hesitation or resistance towards participation in LECs (Agyekum et al., 2022). Lack of know from other stakeholders contextual information can lead to misunderstanding and misalignment (Bahadorestani et al., 2020). Diverse levels of knowledge among stakeholders in various areas can make it challenging to foster knowledge sharing inclusion (Kloprogge & Sluijs, 2006).

Moreover, *lack of capacity*, including financial, technical, time and human capital, can inhibit stakeholder engagement (Agyekum et al., 2022). Initiating and maintaining LECs require significant investment, and while many stakeholders may be motivated to participate, they may lack the necessary resources to do so. Mitigating these limitations through strategic planning and management is a challenge within complexed and dynamic capacity system (Fischer et al., 2020).

2.2 Stakeholders in Local Energy Communities (LEC)

Within the framework of LECs, the stakeholder landscape is diverse and multifaceted, encompassing governmental entities, local residents etc., all of whom are integral to the process of energy transition. The Netherlands has a primarily market-focused institutional structure that traditionally provides limited room for communities. However, there's growing recognition of the potential for community-based energy. Decentralization, a significant aspect of institutional development, boosts opportunities for local organizations and community members, as explained by Oteman et al. (2014). In line with this perspective, Mihailova et al. (2022) argued

for the need to establish a sustainable value co-creation between citizens and other stakeholders (with an example setting - Positive Energy District - a type of energy community). Hence, recognizing the key stakeholders within a LEC forms a crucial preliminary phase in this value co-creation process. This section will explore and synthesize the distinct types of stakeholders involved in LECs, as well as the challenges they commonly encounter.

In the realm of LECs stakeholders form a heterogeneous and dynamic assembly, playing vital roles in the process of energy transition. In recent literature, several key types of stakeholders have been identified, including governmental entities, local residents, network operator, energy service providers, non-profit organizations and local business, each bringing unique perspectives, motivations, and resources to the community (Heuninckx et al., 2022).

2.2.1 Government bodies in LEC

Government bodies at both the national and local levels play a critical role in shaping the policy environment within which LECs operate. Their regulatory and policy-making functions can either enable or hinder the development and success of LECs. Recent Dutch cases offer examples of this dynamic. The Netherlands has seen a marked increase in national government support for LECs recently, reflecting the country's commitment to the goals set in The Climate Agreement. These national goals are the foundation for municipal implementation plans. However, the energy transition's challenges have ignited two disparate responses for the roles of government bodies. One group advocates for centralized leadership, suggesting a need for a 'strong man' equipped with the requisite resources and skills to spearhead the transition. Contrarily, another segment pushes for decentralizing the efforts by involving new players such as citizens, to foster a more inclusive, grassroots transition. Consequently, numerous organizations in the Netherlands have been established to equip local climate and energy initiatives with the knowledge needed to achieve their sustainability goals, thus bolstering the national drive towards cleaner energy (Hisschemöller & Sioziou, 2013).

At the local government level, the role of municipalities has been crucial. Hoppe et al. (2015) examined Lochem (the Netherlands) as a case and underscored the essential role of public officials in driving successful energy transitions. The strategic leadership of these officials, combined with their commitment to serving the community and managing processes reflexively, was instrumental in this success. The achievement was made possible through the tight-knit collaboration and mutual trust established between the local government and community representatives. Warbroek & Hoppe (2017) studied Dutch regions (Overijssel and Fryslân) and revealed that governments innovatively utilize both authoritative and enabling modes of governing to maintain a certain level of influence. In both regions, certain municipalities played an active role, offering support, financial resources, and ad hoc responses. However, there were also municipalities that were less supportive. This lack of support seemed to stem not just from

inadequate administrative capacities, but also from a lack of political priority given to low-carbon energy and the empowerment of local communities by public officials.

2.2.2 Local residents in LEC

Local residents possess a distinctive and equally significant role within LECs. Not only are they the end users of energy, reaping the greatest benefits from LECs, but they have also transformed into local energy producers earning them the title of 'prosumers' within the LECs (Schoor et al., 2016). Furthermore, they are actively involved in the community's decision-making processes, making them engaged participants in shaping their energy future. Arcanjo (2020) argued that while heightened initiatives at the corporate level are crucial, such as government and large companies, reforms to individual behavior can also stimulate these collective changes. Their local knowledge, commitment to the community, and advocacy for the community's interests are of high value.

Recent Dutch cases highlight a nuanced understanding of local residents' roles in LECs, particularly when accounting for their different residential statuses. These statuses encompass homeowners, apartment dwellers, renters in social housing, and members of Homeowner Associations (Vereniging van Eigenaren, VvEs). Homeowners, for example, often play a pivotal role in LECs by investing in and implementing renewable energy systems, such as solar panels (PVs) or heat pumps. Their ability to make decisions about their property can significantly influence the uptake of sustainable energy technologies (Arentsen & Bellekom, 2014). van der Schoor & Scholtens (2015) conducted research on homeowners in thirteen local communities in northern Netherlands, asserting that it's a beneficial grassroots approach for engaging many citizens. They observed that instead of passively accepting changes, these individuals actively participate and engage in the process. The case of Groningen (The Netherlands) is considered as Energy City, exemplified how resident-initiated self-organization has been acknowledged and developed into socio-institutional practices to aid in facilitating the energy transition (Hasanov & Zuidema, 2018). Conversely, apartment dwellers and members of VvEs face unique challenges. Under Dutch law, apartment owners automatically become members of the corresponding Owner's Association (VvE). The VvE safeguards the collective interests of the apartment owners, ensuring the building's maintenance, cleanliness, and insurance coverage (Oostra & Nelis, 2022). The decision-making processes within the VvE can often be complex, potentially delaying the implementation of renewable energy projects. In the context of social housing, tenants typically have limited decision-making power regarding the energy systems in their homes. For single-family dwellings, each tenant makes their own decision. However, in the case of apartment buildings, agreement must be reached by 70% of the tenants (Ossokina et al., 2021). Thirteen VvEs in the cities of Breda and 's-Hertogenbosch were investigated with customer satisfaction framework which makes it possible to identify and structure different relevant factors from the perspective of owner-occupants, contributing to the

realization of energy transition goals (Oostra & Nelis, 2022). Despite these constraints, social housing tenants can still contribute meaningfully to LECs, particularly through participation in energy-saving programs and community engagement activities.

2.2.3 Network operator and energy providers in LEC

Network operator is a company responsible for delivering energy through infrastructure like power lines and gas pipelines. They maintain and operate the infrastructure for transmitting and distributing electricity or gas. Network operators charge energy providers for using their infrastructure but don't sell energy directly to consumers. Energy Provider purchases energy (electricity or gas) and sells it to consumers. They set energy prices, offer plans to customers. Both network operators and energy providers play crucial roles in the energy supply chain. They work together to ensure the reliable delivery of energy to consumers. While network operators focus on maintaining and operating the infrastructure, energy providers are responsible for procuring and selling energy to customers.

In many regions, the energy market is deregulated, meaning consumers can choose their energy provider from multiple companies. However, the network operator is usually a regulated monopoly because it's not practical to have multiple sets of infrastructure (like power lines or gas pipelines) in the same area.

In the context of LECs, they contribute crucial technical knowledge, infrastructure, and resources that enable the generation, distribution, and management of local energy. Modern technology advancements aim to integrate distributed energy resources into local systems, engaging communities and ensuring energy self-sufficiency while supporting the larger energy infrastructure (Koirala et al., 2016). Moreover, Data-driven services represent a significant revolution by providing data-as-a-service. This evolution incorporates advanced technologies like automatic power meter reading and smart grid cloud technology, further driving efficiency and precision (Tan et al., 2007; Rusitschka et al., 2010; Al Haj Hassan et al., 2015; Psara et al., 2022). In addition to technological progression, the optimization of local energy management can also be achieved through a transactive energy-based strategy. This strategy, used in smart multi-carrier energy networks, facilitates indirect regulation of the local energy market and encourages the participation of multiple electricity providers (Ghazzai et al., 2012; Niemi et al., 2012; Zou et al., 2022).

2.2.4 Non-profit organizations in LEC

Non-profit organizations play a significant role within LECs. These entities frequently act as intermediaries among different stakeholders, facilitating communication and collaboration. They also provide essential services such as community education, advices, and often times, serve as initiators of community energy projects.

The Netherlands have the highest percentage of non-profit housing in the European Union. The non-profit housing organizations have several goals and criteria to fulfil. Energy savings and sustainability are high on their agenda, especially since Paris Agreement 2008 (Filippidou et al., 2016).

Non-profit organizations In the Netherlands, often operate as energy cooperatives, becoming key actors in the energy transition. One Dutch example is 'Energie-U' in Utrecht, which uses energy coaches to facilitate the transition towards sustainable energy. These energy coaches are volunteers trained by the cooperative to support residents in making their homes more energy-efficient⁵. A diverse array of organizational structures has emerged in local community energy initiatives. The setups varied considerably, spanning from informal arrangements to formal structures, such village working groups (Schoor & Scholtens, 2015), cooperative arrangements (Hoppe et al., 2015) or the establishment of foundations (Boon & Dieperink, 2014). The initiatives and efforts derived from these non-profit organizations not only serve practical and educational functions but also enhance social cohesion within the communities.

2.2.5 Local business in LEC

Local businesses play a vital role within Local Energy Communities (LECs), acting not just as significant consumers of energy, but also as potential providers within the community. Their participation can have considerable effects on the community's energy consumption, generation, and overall sustainability. Businesses of varying forms and sizes have distinct impacts on LECs, whether they are publicly owned, privately owned, profit cooperatives, large corporations, or small-to-medium enterprises (SMEs). Owing to their unique characteristics, such as interests and preferences, these entities wield different levels of influence within LECs.

Due to their substantial energy use, local businesses such as shops, factories, and offices are potential focal points for energy efficiency measures and renewable energy installations. For instance, companies with large rooftop surfaces, such as warehouses or factories, can install solar panels to generate renewable energy. They can play a key role in driving down a community's carbon footprint through energy conservation and the production of renewable energy. Local organizations, as essential parts of the network, possess the ability to engage diverse entities like small businesses and farmers, encouraging their participation in the initiative's activities. In a study conducted by van der Schoor & Scholtens (2015), six cases highlighted the considerable involvement of these local businesses. Additionally, Walker et al. (2021) conducted a comprehensive study to understand how households, businesses, and communities can leverage the advantages of a smarter, more flexible electricity system. Furthermore, Kortetmäki & Huttunen (2023) suggested that the need for defined

⁵ <https://regionaalenergieloket.nl/indebuurt/initiatieven/energie-u>

responsibilities is increasingly significant due to the multitude of involved actors, with business alliances being particularly prominent among them.

2.3 Stakeholder analysis

There are various research done for stakeholder analysis. Classic stakeholder matrix model was developed by Grumble & Wellard (1997) where power/influence and interest/importance as two dimension of stakeholders, see following figure. The matrix enables categorization of stakeholders based on their power (ability to influence) and interest (level of concern) in the project. The identification of the level of power and interest of each stakeholder allows the stakeholders to be positioned in an array of power/interest, so that the most appropriate management strategy can be chosen. Walker & Devine-Wright (2008) applied stakeholder mapping in a local wind energy project. They concluded that this step was crucial in establishing open communication lines and laying the groundwork for ongoing dialogue. Reed et al. (2009) demonstrated this in their study on a local biomass energy project, finding that this method facilitated better understanding of dynamics within the stakeholder group and informed more effective communication strategies. The following figure is an example of the matrix template taken from one literature.

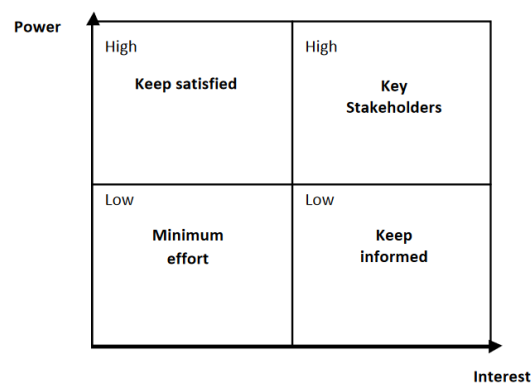


Figure 6: Stakeholders power/interest matrix example (Olander & Landin, 2005)

Varvasovszky & Brugha (2000) developed further concerning the time-frame: past, present, and/or future for positioning stakeholder on interest and influence levels around an issue, to identify opportunities to mobilize support for a particular goal. Walker et al., (2008) described stakeholder visualization tools that can be used to develop a stakeholder engagement strategy, stakeholders profiles can be mapped for engagement plan, see the following figure for example.

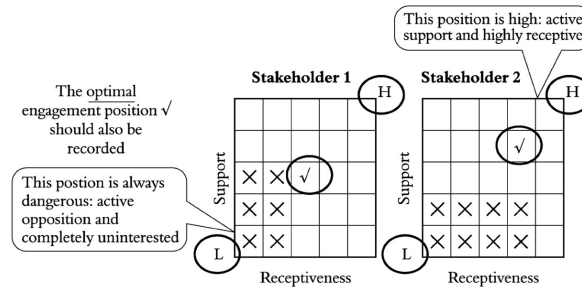


Figure 7: Stakeholders engagement profiles example (Walker et al., 2008)

Radar chart is one of the method to map and compare different stakeholders on various factors with their scores. Bouw et al. (2022) adapted this method to investigate social contextual factors in neighborhood energy planning. Following is one example where community factors of four regions in the Netherlands (four colors) are analyzed and showed in a radar chart.

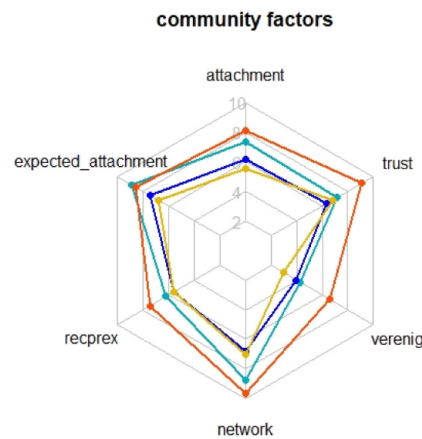


Figure 8: Radar chart example (Bouw et al., 2022)

In this study, the power/interest matrix and radar chart will be adapted as they are suitable for the initial steps of understanding stakeholders. Following by this study drafting plans for enhancing engagement would be further investigated, mapping each stakeholder for the engagement plan could be considered.

2.4 Research gaps and contribution

Since sustainability transformations in the field of energy transitions have only taken place in recent years since 2019 the climate agreement, there is not much experience about this. Especially LEC is a relatively new concept and method proposed as one potential solution for energy transition (Azarova et al., 2019). Despite growing research in recently years about energy transition, literature focusing on effective stakeholder engagement in the field remains limited, especially when it comes to the behavioral mechanisms of stakeholders and the unique challenges they encounter, and it is a challenge for sustainable energy initiatives to continue on a high level (Hoffman & High-Pippert, 2010; Schoor & Scholtens, 2015).

There are literature regarding energy transition focused on different stakeholders alone, for example the government bodies for policy interventions (Hoppe et al., 2015; Warbroek & Hoppe, 2017), or residents for their involvement and participation (Schoor & Scholtens, 2015; Correa-Florez et al., 2020; Oostra & Nelis, 2022). However, there is no study yet to investigate different stakeholders in a LEC at once.

There is also a lack of a conceptual model for assessing stakeholder profiles for the community level (Lange et al., 2018; Lange & Cummins, 2021). Questions are remained regarding how various factors influence stakeholder engagement in achieving collective sustainability goals, what types of support are needed, and what systematic improvements can be made to enhance this process.

This study addresses the gaps from literature, aims to understand multi stakeholders with the complexity of different set of their profiles within one LEC. A novel conceptual model is developed from theoretical study (details see next section 2.5). The knowledge gained from the study not only contributes to the academia, but also assist Leidschendam-Voorburg municipality making suitable strategies that support the communities towards their sustainability goals. The insights and the results of the research will also be shared with the stakeholders within the case and the same methods could be applied in other neighborhoods as well.

2.5 Conceptual model

This following conceptual model offers a systematic framework to understand the multifaceted dynamics of stakeholder engagement and its various influencing factors. Drawing on theoretical underpinnings and empirical research, the model serves as a comprehensive guide to navigate the complexities of stakeholder engagement and finally to propose enhancing engagement strategies. The initial input into stakeholder engagement is the stakeholders' objectives, which provide essential background information for an initial understanding of the stakeholders. The second input, stakeholder profile, encapsulates essential attributes such as stakeholders positions with their interest and influence, and their behavioral characteristics including intention, agency and action. The last input is a set of common or unique challenges faced by different stakeholders. These three inputs collectively offer rich insights into stakeholder engagement, leading to proposed strategies that aim to strengthen stakeholder engagement, thereby facilitating successful energy transition initiatives.

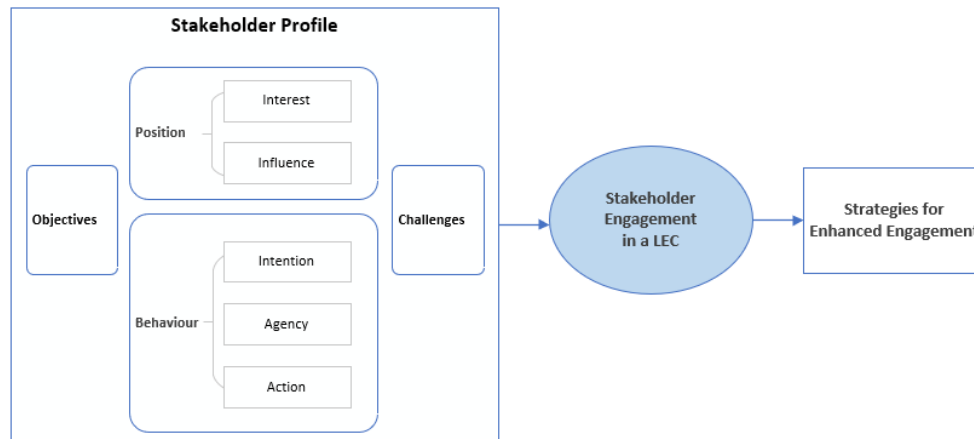


Figure 9: Conceptual model

3. Method

In this chapter, the methodology adopted for this study is explained, starting with the presentation of the research framework that provides a detailed plan for conducting the investigation (section 3.1). Subsequently, the procedure for data collection is illustrated, detailing how information necessary for the analysis is gathered (section 3.2). The later section involves a thorough explanation of the data analysis techniques used in this study (section 3.3). The chapter concludes with an emphasis on the importance of ethics and transparency in the research process (section 3.4).

3.1 Research framework

The research framework in this study for stakeholder engagement has been developed by adopting and refining “stakeholder circle methodology” from project management (Bourne, 2016). Five steps are taken to conduct the research: step 1, identifying stakeholders (section 3.1.1); step 2, prioritizing stakeholders (section 3.1.2); step 3, interviewing (section 3.1.3); step 4, data analyzing - stakeholder profiling including addressing challenges (section 3.1.4); step 5, proposing strategies for engagement enhancement (section 3.1.5).

3.1.1 Identification of stakeholders in a LEC

When analyzing stakeholders in a LEC, the initial step involves identifying entities that can exert influence or make significant contributions to ET. This is to answer the second sub research question of this study: “*Who are the relevant stakeholders in a LEC with the case of De Heuvel/Amstelwijk? (theoretical and practical question)*”. Comprehensive discussion of the relevant stakeholders in a LEC can be found in the literature review (refer to section 2.2). Following this, the specific stakeholders for the De Heuvel/Amstelwijk case will be identified and outlined in section 3.2, titled 'Data collection'.

3.1.2 Prioritization of stakeholders

Once stakeholders have been identified, they will be analyzed using a matrix of interest and influence, based on established stakeholder analysis methodology (refer to section 2.3). This analysis will guide the prioritization of stakeholders for interviews (see next section 3.1.3) based on their relevance and impact, given the time constraints of the research project. The initial stakeholder matrix is presented in next section 3.2. As the research progresses and more information is gathered, adjustments might be made to the interest and power analysis. Consequently, after all interviews conducted and analyzed, an updated interest and power matrix is expected as part of the research findings and conclusions (section 4).

3.1.3 Interviews of stakeholders

In the data collection phase of our research method, we primarily rely on stakeholder interviews. After steps of identifying and prioritizing stakeholders, the interviews are conducted for gaining direct insights and perspectives from various parties who play a significant role in the issue at hand. Residents as the largest group in the community are different for interviews for reaching sufficient number of them, therefore major stakeholders are at first priority approached for interviews⁶. The interviews are conducted using a semi-structured approach, allowing for both pre-determined questions and spontaneous, in-depth discussions to prompt rich, qualitative data. Carefully crafted questions centered around different topics or themes are prepared as a template for the interviews. An exploratory approach is also adopted, allowing for spontaneous questions that arise based on the interviewees' responses. This strategy ensures a comprehensive understanding of the stakeholders by facilitating open-ended discussions, fostering in-depth analysis of their perspectives, and making room for unforeseen but potentially valuable insights.

The interviews offer an intricate understanding of the complexities and nuances of the subject. The collected data not only illuminates stakeholder characteristics but also underscores the challenges each of them faces. Furthermore, it equips us with valuable insights that could enhance stakeholder engagement. The detailed procedure of interviews is explained in the data collection section 3.2.

3.1.4 Stakeholders profiles

Stakeholders characteristics including objective, knowledge, intention, agency action need to be described to understand their positions in energy transition. This is to answer third research

⁶ The residents will be reached out via a survey format to collect information. This will be a follow up research after this study, unfortunately due to time constraint, survey study is not yet investigated. Interviews conducted with major stakeholders especially foundation, housing corporation provide indications from the residents' perspective, and it helps form an understanding that assists in the preparation of the survey questions.

question of this study: *“What are the characteristics of all relevant stakeholders in a LEC with the case of De Heuvel/Amstelveen? (practical question)”*. In this study relevant characteristics are considered and selected in the profiles guided from both literature and interviews. The profiles of various stakeholders will be summarized and some attributes are mapped with scores to compare with radar charts (refer to literature review section 2.3). The data analysis part can be found in section 3.3 and the findings and conclusions can be found in section 4.

Stakeholders' challenges represent a significant component of this study therefore are separated described. We collect and categorize these challenges to gain a comprehensive understanding of the obstacles each stakeholder encounters. This is to answer the fourth research question: *“What are the challenges of stakeholders in a LEC hinder engagement for energy transition? (practical question)”*. Some challenges could be a common challenge from more than one stakeholders; some challenges can be more serious than others depending on the stakeholder's unique situation. These variances will be carefully detailed and prioritized to create a clear and comprehensive overview of the challenges. The corresponding findings and conclusions can be found in section 4.3.

3.1.5 Engagement enhancement

Considering stakeholders' characteristics, their respective challenges, and the interrelationships between them within a LEC. Based on this comprehensive analysis, specific engagement strategies tailored to different stakeholders can be proposed. This is to answer the last sub research question, and finally close the loop for the main research question regarding: *“How to tackle challenges and improve the engagement based on various characteristics of stakeholders? (practical question)”*. The process begins with identifying the expected and current engagement levels for each stakeholder, as well as the gaps between these two states, this can be found in findings and conclusions chapter section 4.4. Subsequently, solutions designed to address the unique challenges will be revealed in recommendations (section 5).

3.2 Data collection

Besides residents, in total 59 stakeholders are found in De Heuvel/Amstelveen. The detailed stakeholders with name, contact person, function of contact person, etc. are listed in an excel with input from desk research and municipality's support in contact details. Part information of the excel as an example can be found in appendix 1, for privacy matter, not all information is presented here. The following table is the summary of the stakeholders in the neighborhood, and how many interviews have been done. Residents are not interviewed in this study, however the owner association, foundation, housing corporation provide substantial information as an indication of the different perspectives of residents and how they are involved.

Table 1: Stakeholders overview De Heuvel/Amstelveen

Stakeholder type	Stakeholder type specific	Number of stakeholders	Interviews done
Government body	Municipality	1	8 ⁷
Non-profit organization	Housing corporation	2	2
	Professional association	1	1
	Sustainability foundation	2	3 ⁸
	Owners association management	5	1
	Owners associations	16	0
Network operator	Network Operator	1	1
Business	Private businesses	15	1
	Public services (sports, swimming pool...)	6	1
Others	Schools (kindergarten, primary, secondary)	7	0
	Churches	3	0

The original plan was to interview 10 stakeholders due to the time constraint, based on the priority from the initial analysis of stakeholders power/interest matrix (see following figure). This initial analysis was aimed to decide which stakeholders are the key stakeholders to be first interviewed. During the interviews, more information will be gathered and the matrix will be updated with further knowledge. The stakeholder matrix shows that the stakeholders are categorized into four categories. As can be seen municipality, housing corporation, and owners' associations are the most important key stakeholders and are interviewed first. The follow-up interviews take place with the stakeholders network operator in 'Keep satisfied' and with the foundations representing residents in 'Keep informed'. However, stakeholders in the 'Minimum effort' category were not overlooked. In the end, 18 interviews were able to be conducted, see the table above with the specific number of interviews per stakeholder.

⁷ Due to a conversation with De Heuvel/Amstelveen that within the municipality, there are misalignment in different departments. Therefore 8 different people (contacts recommended from sustainability policy officer) from municipality are interviewed.

⁸ 2 people from one foundation are interviewed.

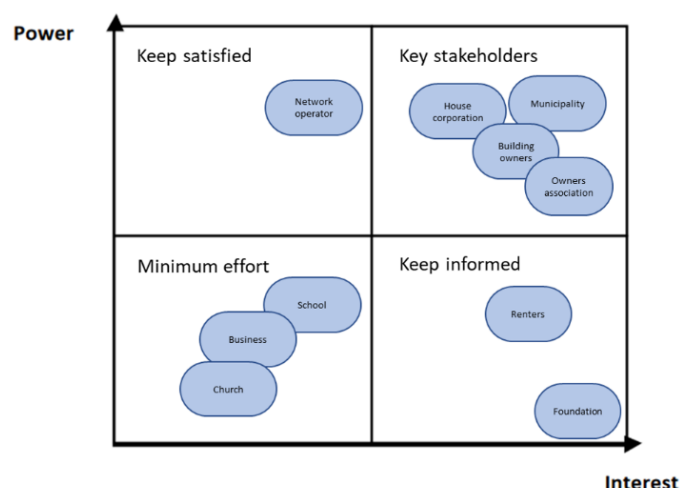


Figure 10: Initial prioritization of stakeholders of De Heuvel/Amstelveen

The respondents were chosen selectively, looking at their role, expertise and involvement in the implementation of the local energy transition at De Heuvel/Amstelveen. All respondents outside the municipality are direct contacts of the municipality who are involved in this transition, which means that a selective choice has been made. Due to time constraints and practical obstacles such as parties not wanting to participate in interviews (especially schools, library, business), not everyone is interviewed. The following table shows the detailed 18 interviewees that have been conducted with their functions.

Table 2: Interviewees overview De Heuvel/Amstelveen

Stakeholder type specific	Stakeholder	Function contact person
Government body	Municipality of Leidschendam-Voorburg	Sustainability policy officer
		MRO Department, Maatschappelijke en Ruimtelijke Ontwikkeling
		Sustainability policy officer
		MRO Department, Maatschappelijke en Ruimtelijke Ontwikkeling
		Spatial development senior policy officer
		MRO Department, Maatschappelijke en Ruimtelijke Ontwikkeling
		Projectmanager "Fijn en veilig wonen" and "Versterkingsprogramma Sterk voor Noord"
		Facility Management Municipality Buildings
		Green Infrastructure
Housing corporation	Vidomes	Asset Manager
		Asset Manager
		Asset Manager

Foundation	Energy Common	Chairman
	Duurzaam Leidschendam-Voorburg	Chairman
		New Chairman
Professional association	MKB ⁹ Leidschendam-Voorburg	Board Secretary
Owners association management	BKS-Beheer	Co-owner
Network operator	Stedin	Key account manager government
Local business	Dirck 3	Location manager
Public service	Sporthal de fluit (also Zwembad)	Location manager

All communication with stakeholders were in Dutch. Before the interviews took place, the purpose and expected duration of the interview were discussed with each respondent via email or telephone. The one to one interviews were done via teams online. At the moment the interview started, a short introduction took place, during which the respondent was asked for permission to make an audio recording (not video for privacy matter). The interview template including the procedure can be found in appendix 2. In short, the interview includes three topics:

- Topic 1: Core tasks [objectives of the stakeholder]
- Topic 2: Stakeholder characteristics [include knowledge, intention etc. behavioral factors and challenges]
- Topic 3: Past present future [trigger deeper thinking/reflection, get extra insights or confirmation/summary from previous topic]

3.3 Data Analysis

Once one interview was completed, the recording was transcribed using Amberscript. After that the transcript was translated into English and subsequently imported into Atlas.ti for further coding. Out of 18 interviews conducted, one was found to provide minimal information on the topic of energy transition. This was because the interviewee was from the culture and history department of the municipality and had limited knowledge on the subject. As such, the data from this particular interview was excluded from the analysis.

A deductive approach is used to arrive at a conclusion based on the available information and existing knowledge. We used Atlas.ti for thematic analysis of qualitative data. The process began with open coding, a technique in which initial titles and notes were applied. New codes were added from new interview transcripts and guided subsequent interviews. For instance, after identifying diverse challenges frequently mentioned by interviewees, we adjusted later interviews to give interviewee more room on elaborating their challenges. We then

⁹ MKB is SME in English, which means small median-sized enterprises.

implemented axial and collective coding to group related codes and categorize them. The following diagram illustrates this code organization. These steps helped construct stakeholder profiles and informed proposed solutions to enhance stakeholder engagement.

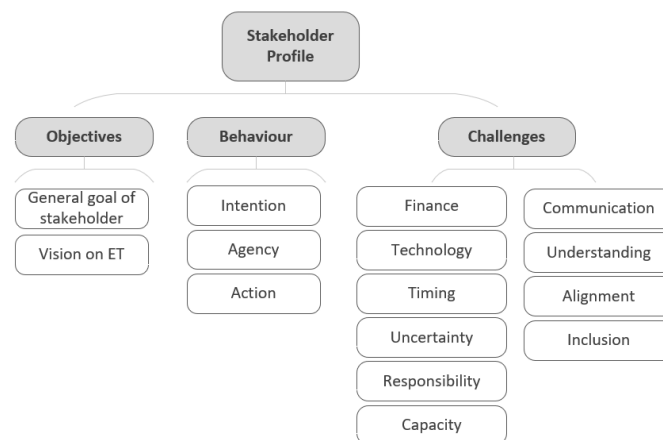


Figure 11: Coding structure

Following coding, behavioral factors (intention, agency, and action) are rated on a 1-5 scale (lowest to highest) to facilitate radar chart creation and stakeholder comparison. When multiple interviewees were considered, we used an average scoring method. For instance, if a stakeholder's knowledge is prevalent in an interview, it might receive an score of 5 (one or more places in the transcripts where they indicate clearly with high level of knowledge are also coded with “knowledge 5”). When such codes within a single interview vary with level, a score is given by analyzing all relevant codes and taking an average. Upon finalizing the coding and scoring of behavioral factors, we assess power and interest by drawing insights from the interviews. These evaluations also receive scores from 1-5, allowing their integration into radar charts for stakeholder comparison. Often, multiple readings and analyses of transcripts are required during the scoring and evaluation process. Moreover, a second researcher from the project team verifies all scores and evaluations to maintain the four eyes principle. The findings can be found in next chapter.

3.4 Ethics and transparency

This study is conducted ethically and transparently. The research team consists researchers from University of Applied Sciences Utrecht (HU) and the Hague University of Applied Sciences (Haagse) and assumed a neutral position. Interviews involve human subjects and personal data, therefore some considerations that are taken into account while conducting the research:

- Informed consent: each organization or individual being interviewed is fully informed of the nature of the study, their role in the study, and how the data will be collected and used.

- Privacy and confidentiality: each individual being interviewed remains anonymous and it is ensured that the identity of the participants is not disclosed and not traceable.
- Conflicts of interest: the author declares no competing financial interests or personal relationships that could have appeared to influence the work.

All data and research content is saved in Hogeschool Utrecht environment, research drive which is dedicated to research projects is secured within university. Besides this, data management plan with privacy and ethics aspects was conducted and approved by NWO and municipality is aware of it. Given the municipality's role in representing residents and its significant interest in protecting their privacy, this research was conducted in consultation with the municipality when engaging with individuals.

4. Findings and Conclusions

Following analysis, research findings and conclusions are presented below, including stakeholders objectives (section 4.1), stakeholders maps (attributes including power/interest, intentin/agency/action) (4.2), stakeholders challenges (section 4.3) and expected/current levels of stakeholder engagement in the LEC (section 4.4).

4.1 Stakeholders Objectives

Stakeholders' objectives were collected through interviews and supplemented with information obtained from desk research, primarily from their official websites. A summary of these objectives is presented in the table below.

Table 3: Stakeholders objectives De Heuvel/Amstelveen

Stakeholder	Objectives
Municipality	The municipality of Leidschendam-Voorburg a local government represents the interests of the residents, businesses and other organizations within its jurisdiction. As part of the energy transition, the municipality of Leidschendam-Voorburg has set itself the goal of reducing greenhouse gas emissions, improving energy efficiency and promoting the transition to sustainable energy sources.
Housing corporation	Vidomes and Wooninvest are two housing corporations in De Heuvel/Amstelveen. With a management and rental of homes in this municipality, they offer suitable, sustainable and affordable houses to residents. They expressed to make living possible especially for people with limited budgets in best possible way.
Foundation	Energy Commons Leidschendam-Voorburg and Sustainable Leidschendam-Voorburg Foundation act as a mediator role between municipality and residents. They aim to promote sustainable development in the municipality and to encourage residents to live sustainably. They bring residents into contact with each other to exchange knowledge and experiences and to inspire each other.
Network Operator	Stedin is a network operator in the region and its responsible for the management and maintenance of the energy network in the regions of South Holland, Utrecht, and partly in North Holland. Stedin represents the interests of both consumers and companies that depend on a reliable energy supply and transport.
Professional Association	MKB Leidschendam-Voorburg represents the interests of the entrepreneurs at the table, acting as the bridge between the municipality and small median enterprises. They are involved in discussions with the

	municipality, politicians and other stakeholders and organize network meetings and theme meetings for entrepreneurs.
Owners Association Management	BCS Management represents Owners' Associations (VvEs). They facilitate, coordinate and support VvEs. They also provide input for decision making, in areas such as energy transition and sustainability aspects. Customer satisfaction is key for them.
Private Business	Supermarket Dirk operates their daily business to sell products to the residents and make profit.
Public Service	The umbrella organization de Fluït owns a swimming pool and sports hall in De Heuvel/Amstelvijk district. They receives orders from municipality and deliver what is requested.

An important note is that the municipality of Leidschendam-Voorburg presents a complex ecosystem of varying departments, each contributing to the intricacies of its operation. This complexity was further amplified by the absence of a designated project leader for the energy transition throughout the duration of this study, due to health reasons. As such, knowledge about this project had to be sourced from different departments.

For instance, the Sustainability Policy Officer has jurisdiction over the participation strategy for neighborhood residents. Meanwhile, the Facility Management Municipality Buildings department undertakes the task of transitioning municipal buildings towards a gas-free model. The Project Leader and Program Manager of 'Sterk voor Noord' primarily aim to foster a pleasant and secure living environment for district residents. Their strategic purview encompasses collaborations with the housing corporation, educational institutions, financial self-reliance, and concerns of energy poverty which directly influence specific aspects of the energy transition.

4.2 Stakeholders Maps

The table below presents scores for five attributes of stakeholders ranging from 1-5. These scores were then visualized through radar charts, each differentiated by color, representing the positions of all interviewed stakeholders across various factors. Ultimately, a comparative analysis of stakeholders was accomplished by overlaying these radar charts.

Table 4: Stakeholders scores De Heuvel/Amstelvijk

Attributes	Municipality LV	Housing Corporation	Foundation	Network Operator	Owners association management	Private Business	Public Service
interest	5	5	4,7	5	4	1	3
influence	4,8	4	3,7	3	4	1	2
knowledge	4,6	5	4	4	3	1	3
agency	3	3	2	2	3	1	4
intention	5	5	5	5	5	1	3
action	4,6	4	5	5	3	2	5

Consider the municipal as the top stakeholder to interview due to their high power and interest. Their analysis and radar chart illustrate that most attributes have high values, in contrast to the agency, which scores lower. See the subsequent radar chart and some motivations regarding their scores.

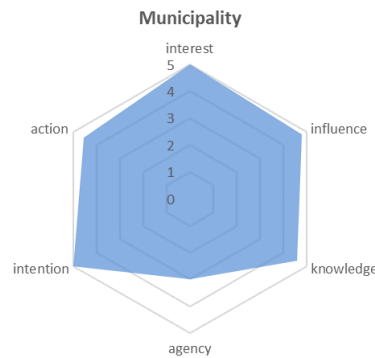


Figure 12: Radar chart Municipality De Heuvel/Amstelveen

The municipality has a very high level of knowledge for energy transition see one evidential code¹⁰: *“Yes, well, I think we know a lot ourselves already through education or experience. And as well from the state-province program, natural gas-free neighborhood and a lot of webinars and the reports.”* Certain codes contribute to determining the level of the municipality within their agency, e.g.: *“... it is difficult to make decisions when planning for the future. It's not always possible to accurately determine all the steps in a ten-year schedule, and things often take longer than expected. However, doing nothing is not an option...”* The municipality appears to be spearheading the energy transition in terms of strategizing and policy-making. However, they acknowledge that not all elements are within their control. For example, they face time constraints with uncertain for the future and expressed that the responsibility does not lie solely with them. It is crucial to empower all parties involved to take action. These details are further elaborated in the next section challenges¹¹.

Housing corporations and foundations serve as key stakeholders like the municipality confirm themselves in a situation similar to that of the municipality, displaying high knowledge and strong intention, yet having a lower agency. This is shown in the following radar chart, which is accompanied by specific codes.

¹⁰ More codes examples can be found in Appendix 3.

¹¹ Low agency is often associated with the challenges that stakeholders encounter. A comprehensive description of the challenges faced by stakeholders can be found in section 4.3.

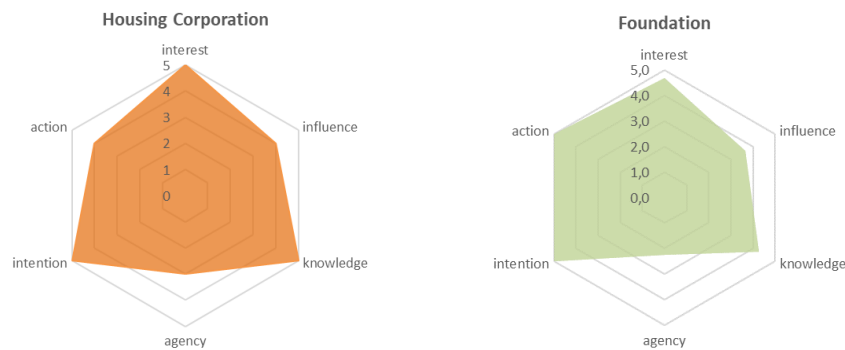


Figure 13: Radar chart Housing Corporation and Foundation De Heuvel/Amstelveen

For example housing corporation mentioned budget is one important obstacles “...so we also want to benefit as much as possible from collective things...our tenants can't pay much rent...” “...has to be affordable and it's incredibly expensive...especially with the eye of to the tenant...”. While foundation indicated that their actions are limited by capacity constraints: “... that is also a real problem. We are just a volunteer organization so our capacity is really limited...” “...we only have limited capacity, especially when it comes to VvEs...we notice that they are holding back.” And what they can do within their role as filling gaps between municipality and residents is limited if two sides have different expectations: “...residents came to hear from the municipality what it was going to do and where it could help, but the municipality wanted to hear from the residents what they were going to do...”. The analysis reveals that these non-profit organizations, independent from the municipality, can play a significant role in enhancing communication, alignment, and inclusion by connecting the municipality and residents in the energy transition. However, further support could be implemented to help their low agency, thereby optimizing their role.

The network operator, initially perceived as a stakeholder with less interest, has been identified as one of the key stakeholders as well. Currently, they possess less power to influence energy transition. However, they exhibit high intention, knowledge and action, although their agency is quite low. See the following figure and some associated codes for further insight into their agency.

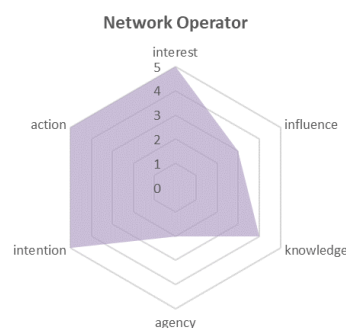


Figure 14: Radar chart Network Operator De Heuvel/Amstelveen

Network operator expressed many of their capacity limitations for low agency: “...we also struggle with shortages in the market, including personnel, materials, and financial resources... another

challenge we face is the complexity of society. We want to expand our presence in the public space, but there is less and less room available.” and unclear role and responsibility as the barrier: “to make your position very clear. Because what are you allowed to do or what can you do as a network operator formally?”.

For owners association management and business, less full radar charts are observed. It is clear that private businesses display less interest in the energy transition, leading to a lack of awareness to be engaged. While some shops declined an interview, one supermarket named Dirk agreed to a brief conversation. From the interview, it is apparent that there hasn't been significant activity yet in energy transition. See following figure and codes represent their inputs.

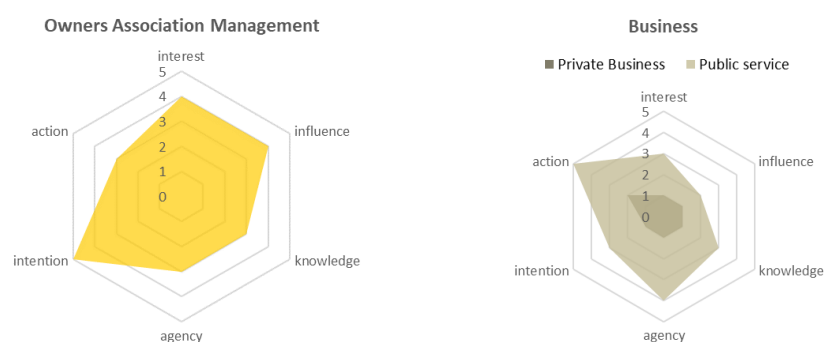


Figure 15: Radar chart Owners Association Management and Business De Heuvel/Amstelveen

For instance, the owners' association management asserted that the uncertainty of technological development constrains their actions and also presents time-related challenges.: *“...a lot of techniques are still in their infancy and still have to be researched... the municipality wanted to give a substantial subsidy... but that just didn't make sense at the time, then we could only generate a very small amount of the energy needs through solar energy...”* It is clear municipality gives instructions to public service what to do, and it executed well but less proactive role *“The municipality states, very simply, we want a number of things to be taken up and we are the ones who have to implement it because we operate on their behalf...”* On the other hand, private business shows no awareness of ET at all: *“Well, we're not really into it.” “No, we have not been to the municipality for that.”*

The figure below presents a comparison of all interviewed stakeholders. From this comparison, it can be inferred that a majority of the stakeholders interviewed, except from the business sector, demonstrated a high degree of involvement in ET, as evidenced by their strong intentionality. These stakeholders also tend to possess a high level of knowledge on the topic, complemented by various channels for knowledge sharing and learning. Substantial actions toward the energy transition have been observed among these stakeholders.

However, it should be noted that none of the stakeholders displayed the highest level of agency. This lack of agency can be attributed to various factors such as scarcity of capacity – encompassing human capital, material availability, time constraints – uncertainties related to

technology and its development, and the lack of clear responsibilities. These factors collectively serve as obstacles to further action and are manifested as challenges which will be discussed in the subsequent section.

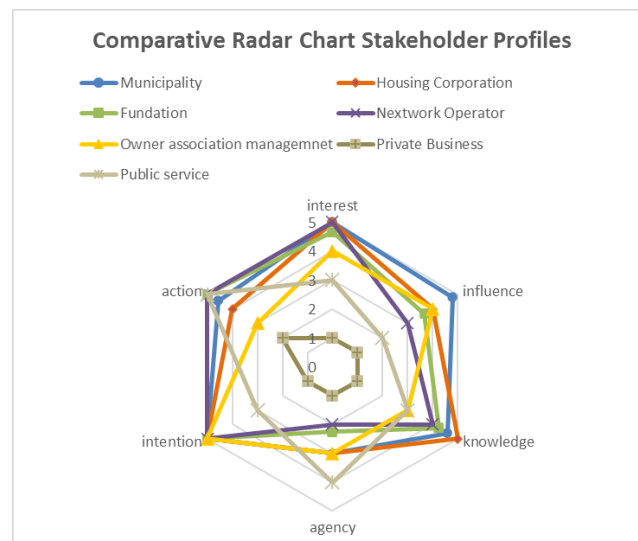


Figure 16: Comparative Radar Chart of Stakeholder Profiles De Heuvel/Amstelvijk

As discussed in section 3.2, an initial power/interest matrix was made to prioritize stakeholders for interviews. Following these interviews and subsequent analysis, an updated matrix can be provided, as seen in the figure below. Note that the stakeholders marked in grey were not directly interviewed. Building owners and renters are residents and they not yet included in the research, however their positions are assumed with the information provided by owners association management and housing corporation. Schools and churches were neither not responding or not willing to participate for interviews, this shows indirectly their interest. Most stakeholders remain the same position as the initial analysis showed, however a key observation is that both the foundation and network operator exhibit high interest and high power, leading to their reclassification into the key stakeholders box.

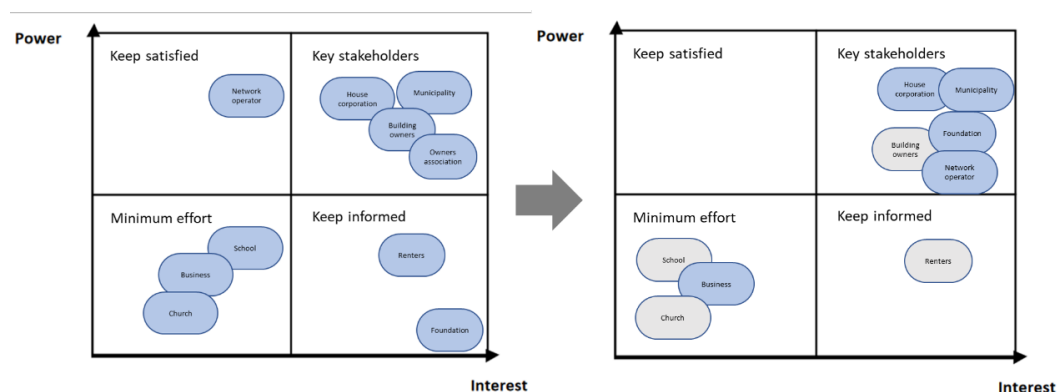


Figure 17: Updated stakeholders power/interest matrix of De Heuvel/Amstelvijk

4.3 Stakeholders Challenges

Different stakeholders have voiced various challenges, each varying based on their respective roles and perceptions. We've gathered these into six major categories: finance, technology, timing, uncertainty, responsibility, and capacity. Each of these categories captures a specific type of obstacle that stakeholders face during the energy transition process. A comprehensive table is provided below that summarizes these challenges for each stakeholder (part from business stakeholders, not much insight was gained due to less interest). The color in the table is indicative of the severity of each challenge as perceived by the respective stakeholder. This visualization can help create an understanding of how the challenges are distributed across different stakeholders. However, it's important to note that the perceived intensity of a challenge is purely subjective, based solely on a stakeholder's perception within their own organization. This underlines the complexity and diversity of the challenges involved in energy transition, emphasizing the need for context-specific and adaptive solutions.

Table 5: Stakeholders different challenges De Heuvel/Amstelveen

Challenges	Municipality LV (Interviewee 01-08)	Housing Corporations (Interviewee 09, 10)	Foundations (Interviewee 11-14)	Network Operator (Interviewee 15)	Owners association management (Interviewee 16)
Finance	The government is now dedicating more funds than in the past (energy crisis) therefore financial challenge has recently reduced for the municipality (interviewee 02). ET falls under the same budget as other sustainable initiatives such as circularity (interviewee 03). Maintenance for future proofing vs. Rebuild is often a dilemma (see also Technology) (interviewee 03).	Finance is this stakeholder's primary hurdle, as they strive to balance low rent for low-income tenants with expensive property upgrades for the 2050 off-gas mandate. Limited resources require careful long-term planning. Despite rising costs and lower rental returns, the aim is to stay affordable for lower-income tenants.	One foundation indicated that they would like the municipality to provide more funds to their foundation so they can deploy more people and increase their reach and more funds to residents so that action can be taken (interviewee 12).		There are high cost e.g., building material price increasing, central boiler. It's preferable to wait for newer, cost-effective technologies while maintaining a financial buffer for this transition (see technology and timing).
Technology	There is no clarity yet on what technologies will be available in the neighborhood (interviewee 01, 02), therefore flexible solutions are preferred (interviewee 02).	The stakeholder doesn't perceive technology as a significant challenge, provided one example that the energy requirements is not clear to them with high-temperature heating collective systems.		The system faces significant challenges, especially with congestion. It's crucial to encourage customer realism in expectations and foster self-reliant problem-solving.	Space and shadow issues limiting energy yield from solar panels and making subsidies unfeasible at the time. Technology decisions must consider current installations, like heating systems that could last another decade.
Timing	The municipality has to work within a timeline with objectives for 2030 and 2050, but remains dependent on other stakeholders (e.g. residents, housing corporations) to decide on the transition,	The 2050 off-gas deadline is a significant constraint, necessitating strategic planning and timely investments to meet	Some residents are in favor of the ET but they are considering selling in a few years and therefore prefer to not invest, or are waiting for	"we can take action in the meantime to prevent these problems from arising or how we can	The stakeholder sees many VVEs are panicking to rush things towards energy neutral goals, but it needs to

	with each stakeholder moving at its own pace – the municipality has no authority to cut gas, for example (<i>interviewee 02</i>). Planning is also difficult due to uncertainties and interdependencies, but overall timeline is coming top-down, creating pressure and urgency - “it’s like a puzzle where decisions can’t be made tightly” (<i>interviewee 03</i>). At the same time, tenants demand a quick solution to rising energy prices (<i>interviewee 05</i>).	this goal. The stakeholder also mentioned that sometime no time to communicate with tenants properly.	subsidies from the municipality (<i>interviewee 12</i>). Sense of urgency is spread among citizens, but they expect the municipality (<i>interviewee 12</i>) or the municipality and the housing corporations (<i>interviewee 13</i>) to take action first, but their timeline is too long (<i>interviewee 12, 13</i>).	delay the issue to buy ourselves some more time.”	be wisely planned with sufficient returns in investment. Some innovation is already done, then its not wise to do similar thing now (see technology).
Uncertainty	Uncertainty on tools: energy transition is seen more as a program than as legal policy – the municipality has no direct authority on residents’ decisions regarding energy transition (<i>interviewee 02</i>). Further, heat legislations are not yet well specified leaving a legal void (<i>interviewee 02</i>)	Technology development is uncertain.	It is difficult to determine which technology brings the highest societal benefit, minimizes societal cost, and effort for the municipality (<i>interviewee 13</i>).		Technology: Many nascent technologies, particularly collective heating systems like heat pumps, require further research.
Responsibility	The local energy strategy is not a legal requirement it's just established policy. There must be a clear plan with tasks and clearly assign roles and responsibilities, it is still a bit of an exploration (<i>interviewee 01, 04</i>). This requires clear leadership and someone taking charge of coordinating effort (<i>interviewee 04</i>). Our role is both supportive and decision-making. We aim to aid and guidance while also determining the best course of action. However, it's important to note that the energy transition itself is not our sole responsibility (<i>interviewee 08</i>). The housing		Politics thinks that imposing too much is not good, and it must be done voluntarily. We disagree because if it's voluntary, it's not going fast enough. The residents wanted to hear from what municipality was going to do and where it could help, but the municipality wanted to hear what residents were going to do (<i>interviewee 12</i>). Where does the entrepreneur come into play? What	It is essential to have your position very clear. What are you allowed to do or what can you do as a network operator formally?	

	corporation can play a much larger role (<i>interviewee 08</i>).		decisions can the entrepreneur make on their own and what requires involvement from the municipality? (<i>interviewee 14</i>).		
Capacity	HC is limited in face of the complexity of facilitating ET (<i>interviewee 02, 03</i>) Resources are limited (e.g. contractors, network capacity), so even when residents are in favor of ET and can receive subsidies, they encounter constraints (<i>interviewee 03</i>).	With limited resources, considerations need to be made for contractors, materials, etc., if everyone is to insulate their properties.	Foundations' human capital is insufficient to support 37,000 households, suggesting the need for paid services to supplement volunteer efforts (<i>interviewee 11</i>). Volunteer-based operations may not fully support ET due to personal commitments (<i>interviewee 14</i>). LEC is not yet self-sustaining in terms of energy production, so it relies on other parties and is exposed to price and availability risks (<i>interviewee 11</i>).		

High challenge:



Median challenge:



Low challenge:



Beyond the challenges detailed in the preceding table, several stakeholders - notably the municipality, foundation, and housing corporation - frequently refer to issues related to communication, understanding, alignment, and inclusion. Consequently, these challenges are discussed separately in the tables below:

Table 6: Communication challenge De Heuvel/Amstelveen

Communication challenge	
Municipality	Effective communication via a comprehensive communication strategy with residents is critical but difficult to achieve (<i>interviewee 01, 08</i>), partly due to limited trust and lack of relationship (<i>interviewee 01</i>). Diverse levels of knowledge of ET (professional jargon, or basic understanding of its principle) make communication with residents difficult (<i>interviewee 07</i>). Diverse language background (40 different nationalities) makes it difficult to connect and communicate with large parts of the target group (<i>interviewee 02, 03, 04, 08</i>). Sometimes communication coming from the municipality is taken with little trust and seen with unfavorable attitude (<i>interviewee 06</i>). Communication must be used carefully and strategically to provide sufficient info to address concerns without steering unnecessary unrest or speculation (<i>interviewee 08</i>). There are communication and coordination issues also within the Municipality, with different functional areas working each independently (<i>interviewee 04</i>) and not understanding each other (<i>interviewee 05</i>).
Housing Corporations	Awareness and mutual communication is needed. Sometimes cannot communicate property due to short time (see timing) (<i>interviewee 10</i>). A lot of communication is needed and in simple language to make sure that people understand things and don't get panic from what they see in the media especially people in energy poverty (<i>interviewee 09</i>).
Foundations	Communication is essential, especially regarding timelines and financial arrangements (<i>interviewee 13</i>). Especially in the case of collective decision making, well informed residents will be more comfortable signing for a change when necessary (<i>interviewee 13</i>). However, the communication of technical contents from experts in ET to non-experts (e.g. MKBs) is challenging, as there is no mutual understanding (see 'understanding') (<i>interviewee 14</i>). Communication is also hindered by diverse areas of expertise across stakeholders (see "alignment") (<i>interviewee 14</i>). There is a vacuum between the municipality and inhabitants, so collaboration and communication lines need to be established (<i>interviewee 11, 12</i>). Residents feel uninformed and demand for more information and knowledge from housing corporations (also "understanding"), and sometimes have limited trust towards the municipality (<i>interviewee 13</i>). One foundation indicated that they would like the municipality to also provide more info to their foundation (<i>interviewee 12</i>). Currently communication covers different ideas, programs, and groups, and needs to be more cohesive and convincing (<i>interviewee 11</i>). Language barriers (<i>interviewee 11, 13</i>) and the use of jargon in the documents (<i>interviewee 13</i>) make communication difficult. Limited intellectual capacity locally requires in-person visits and efforts to make the connection between ET and individual interest (see also 'understanding') (<i>interviewee 14</i>).

Table 7: Understanding challenge De Heuvel/Amstelveen

Understanding challenge	
Municipality	VVEs with private owners often do not possess sufficient knowledge and understanding to make good decisions regarding the ET (interviewee 02).
Foundations	Residents claim to have limited information and knowledge regarding ET, are not kept up to speed by municipality or housing corporations, so their sense of urgency finds no answers (also “inclusion”) (interviewee 13). Limited knowledge and understanding of options regarding ET pushes residents to focus only on certain aspects (e.g. what type of installations they will see in their house) vs. Other important elements (e.g. source of energy) (interviewee 13). These hinder the effectiveness of communication between experts and non-experts (see also ‘communication’ (interviewee 14). Limited intellectual capacity of MKBs and residents requires in-person visits and efforts to make the connection between ET and individual interest (see also ‘communication’) (interviewee 14).
Network Operator	People often interpret news to align with their preferences, leading to diverse perspectives, and potentially causing confusion and misunderstandings in technical discussions.

Table 8: Alignment challenge De Heuvel/Amstelveen

Alignment challenge	
Municipality	Stakeholders move at different pace (also “timing”) (interviewee 02) and have different interests (interviewee 05) and although the council leads, each building can choose its own solution for the transition, even when it is not the preferred one (interviewee 03). Language and cultural differences create tensions across residents (interviewee 04, see also Communication).
Housing Corporations	If you want to be able to implement integrated plans, yes, then you do indeed need to get 70 percent of the tenants' net approval for that plan (interviewee 10).
Foundations	Different stakeholders host different specialized knowledge and interests which are difficult to bridge, also in connection with broken communication (see ‘communication’) (interviewee 14). These misalignments hinder the transition at societal level (interviewee 14). Different stakeholders have different timelines/thinking horizons (also “Timing”). For example, the municipality thinks of 2050 but one foundation indicated they think in terms of future generations (interviewee 11). Each homeowner association acts independently, pursuing their own course of action (interviewee 13).
Network Operator	The growing assertiveness of citizens and the diverging interests of various stakeholders create complications.

Table 9: Alignment challenge De Heuvel/Amstelveen

Inclusion challenge	
Municipality	Inclusion is fundamental and is seen a tool alternative to forced compliance. Inclusion also means accepting some degree of diversity in the solutions, some iterations, and some flexibility (<i>interviewee 03</i>). Some residents desire more support and intervention from the municipality than others, so it is difficult to understand their willingness to engage them and it is difficult to include everyone (<i>interviewee 03</i>). Companies do not participate when invited (<i>interviewee 03</i>), but even when residents cannot be included, companies, organizations and associations should be active in ET to kick start a change (<i>interviewee 07</i>). Participants to municipality initiatives are typically the ones who are already engaged, expanding reach is very difficult (<i>interviewee 04</i>). High turnover of residents (20-25% yearly) makes it difficult to build rapport (<i>interviewee 04</i>).
Housing Corporations	The circumstances must be made attractive for all involved (<i>interviewee 10</i>). People with less education level are difficult to be reached, they need more and simple explanations (<i>interviewee 9</i>).
Foundations	See "understanding". Entrepreneurs represent a minority (10%?) locally, and may have different interests compared with the majority (80%) of residents, therefore "someone needs to keep shouting for them". This is however difficult because the foundations representing entrepreneurs is based on volunteer work (see also "capacity HC") (<i>interviewee 14</i>). Successful inclusion requires true connection, which takes time to build (<i>interviewee 14</i>). MKBs are quite difficult to involve, with participation being sometimes low (<i>interviewee 14</i>).

4.4 Engagement Levels

Drawing from the profiles and challenges of stakeholders, as illuminated through both theoretical and practical research, we can propose tailored solutions for different stakeholders. The first crucial step is to set out the expected and current levels of stakeholders' engagement. This provides a clear understanding of current position of different stakeholders on their engagement levels and their gaps to their own optimal levels of engagement. Following this, corresponding strategies to enhance engagement will be suggested in chapter 5 recommendations.

4.4.1 Expected levels of stakeholder engagement

The expected levels of stakeholders in a LEC (case of De Heuvel/Amstelveen) can be seen in the following figure, adapting theoretical definitions of engagement from section 2.1.1. Firstly, the **municipality and non-profit organizations** appear to have a greater interest and influence in the ET and should therefore take the highest level of engagement. This implies being proactive, taking the initiative most of the time, and sometimes undertaking a leadership role (especially for municipality) when necessary. Secondly, **network operators** are experiencing a role transition from being just energy providers to becoming significant active participants in

the ET. Owing to their advantages in technical knowledge, infrastructure, and resources essential for managing local energy, they are ideally positioned to offer advice on technological options for local energy operation and design, thereby facilitating decision-making within the community. Finally, residents and businesses need to actively participate in this journey with commitment. Their participation can lead to a successful transition, primarily driven by their sense of ownership and democratic principles. However, it's crucial to understand that each stakeholder should aim to reach their individual optimal level of engagement, which doesn't necessarily mean achieving the same, highest level of engagement. For instance, it may not be necessary or beneficial to overload residents and businesses with comprehensive information regarding policy and technology. Instead, suggesting relevant pieces of information can foster transparency, establish trust, and minimize confusion. Given the reasoning provided above, the anticipated engagement levels for each stakeholder are illustrated in the following figure.

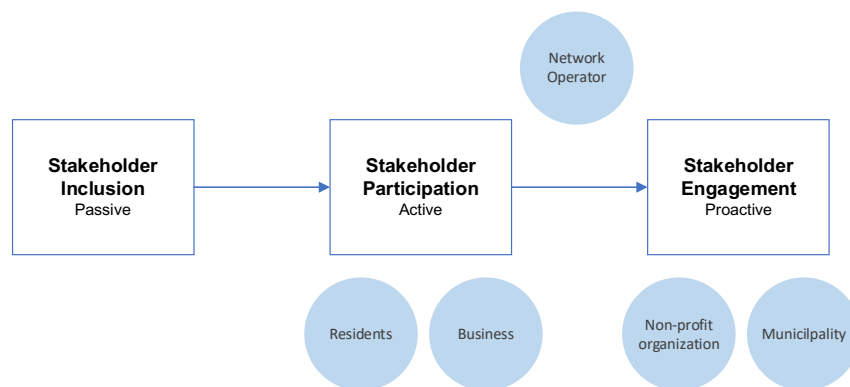


Figure 18: Expected levels of stakeholder engagement LEC - De Heuvel/Amstelveen

4.4.2 Current levels of stakeholder engagement

The current engagement levels of stakeholders in a LEC (case of De Heuvel/Amstelveen) are illustrated in the following figure. According to the analysis, none of the relevant stakeholders have yet reached their optimal level of engagement. The arrows in the figure indicate both the direction and extent of progress needed to reach this optimal level. The **municipality and non-profit organizations** have already made significant progress of their engagement level especially since the Local Energy Strategy of Leidschendam-Voorburg has been made. However, certain challenges and limitations are hindering their actions. For instance, the municipality has experienced disruptions due to changes in project leadership, having replaced the project manager couple times, and currently still lacks a dedicated project manager to lead the energy transition. Within the municipality, there's also a misalignment of knowledge, interest, and responsibility, leading to inefficiencies in policy-making and decision-making processes. Non-profit organizations have expressed that enhanced support from the municipality could alleviate their challenges, as constraints in human resources and time hold back their activities. **The network operator** seeks a clear understanding of its role and

responsibilities, especially since they have already undergone changes due to the turbulent environment of this transition. If they know what their position can be and how they can execute it, their contributions to the transition can be significantly improved. Finally, ET is most concerned about the involvement of end users, namely **residents and businesses** who stand to benefit most from ET. Their role has evolved from being mere consumers to prosumers - those who both consume and produce energy. Their active participation is acknowledged as crucial within the LEC. However, in De Heuvel/Amstelveen, there is a significant journey ahead to achieve genuine participation. Currently, their involvement appears to be facilitated through intermediaries like non-profit organizations. Examples include the energy common with energy coaches and the SME association. They are currently transitioning from a passive to an active role in the ET, however their level of participation hasn't fully materialized, as noted by non-profit organizations. Residents are seen with increased awareness of ET particularly due to the evident energy price increase. However, several factors such as diverse backgrounds encompassing various nationalities, languages, and cultures, coupled with a lack of knowledge and information, as well as varying expectations of the municipality, complicate their progression towards being reached, included, involved, and ultimately participating actively. Furthermore, small businesses, primarily focused on their daily practices, represent a minority group that can easily be overlooked. A significant boost in their awareness, interest and knowledge levels is required for them to take an active part in the LEC.

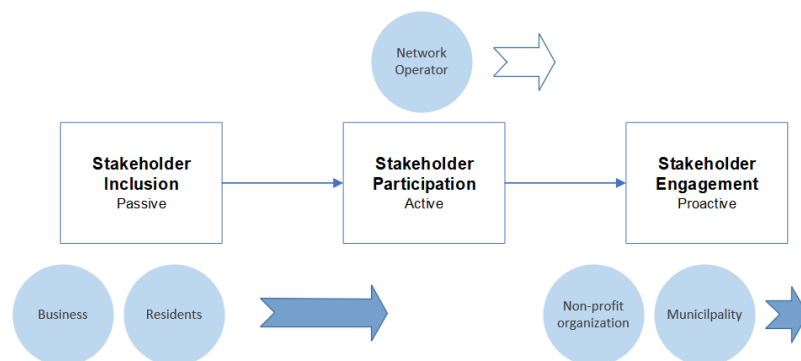


Figure 19: Current levels of stakeholder engagement LEC - De Heuvel/Amstelveen

5. Recommendations

Based on research analysis, findings and conclusions, stakeholder engagement enhancement strategy can be proposed. In general, there are various important aspects that need attention and can be improved to engage stakeholders.

5.1 Clear Responsibilities

it is crucial to distribute significant decision-making power to stakeholders. Stakeholders can only be actively involved when they have a stake in determining the future direction of matters.

Identifying roles and responsibilities for community members in the LEC will allow for greater engagement. As Freeman (1984) argued, it's essential to distribute decision-making power to stakeholders, allowing them to actively participate in shaping the future direction of matters in which they have a stake.

In some interviews, it was noted that the role or purpose of engagement in Energy Transition (ET) isn't always consistent. It varies depending on the actor's role, their overall objective, their perception of their responsibility within the energy transition, the specific objective at that moment, and the stakeholders' understanding. Moreover, stakeholders have different expectations regarding the role of engagement. For instance, residents anticipate receiving information and decisions from the municipality, along with necessary support (a Top-Down approach), while the municipality expects engagement to ensure voluntary participation and consensus (a Bottom-Up approach).

For the long-term success of ET, local ownership is key. However, this cannot be achieved immediately, especially in the early stages. Stakeholders, particularly residents and smaller parties (SMEs), may not fully understand various aspects of ET. An efficient and effective Top-Down approach could accelerate this process. The municipality, as the stakeholder with the highest interest and power, could lead this initiative. Over time, the Top-Down approach is expected to diminish, and a more inclusive, collective approach involving all stakeholders may become more prevalent. Therefore, clearer expectations regarding the role of engagement must be established accordingly. This requires a clearer locus of responsibility, delineating and communicating each actor's scope of action more explicitly. A RACI chart (IIBA & Analysis, 2009)¹² could be a beneficial exercise in every step LEC is taking for ET, clarifying who is responsible, accountable, consulted, and informed about various aspects.

5.2 Effective Communication

Communication among various stakeholders is not always effective due to several factors, including knowledge gaps, language barriers, lack of a cohesive strategy, unclear purpose, and difficulties in outreach. Therefore, a tailored communication strategy is necessary to serve different purposes.

¹² RACI chart sometimes also called Responsibility Assignment Matrix, is a tool to describe four type of responsibilities in project management. See: https://en.wikipedia.org/wiki/Responsibility_assignment_matrix

- Information should not be presented all at once; instead, it should be disseminated in stages over time.
- Communication must be intentional, strategic, and focused on delivering the necessary information to facilitate progress and address concerns without causing unrest or raising additional confusion.
- A top-down approach communication may be suitable to ensure everyone is well-informed and reaches the same level of understanding, especially regarding costs and benefits – essentially answering the question, "what's in it for me?"
- Simultaneously, two-way communication, and encourage bottom up communication are crucial to understand mutual interests, align with each other, build trust, and collaboratively find solutions. This openness can drive community engagement and foster a greater sense of belonging.
- Identifying gatekeepers who can connect local systems with external knowledge sources and act as knowledge brokers is particularly important. Consider allocating funds to enhance the capacity and skills (e.g., understanding of technology and current developments, language proficiency) of the 'middle man' - an intermediary figure who can connect on an individual level.

To implement the communication strategy effectively, various communication channels can be established. Regular community meetings can be organized to share updates about the local energy initiative. Community newsletters, emails, and a dedicated online portal can keep everyone informed about the progress. Sharing the impact of the local energy project, demonstrating tangible results, such as energy saved or carbon emissions reduced, can motivate community members to maintain their engagement and underscore the importance of their contributions to the energy transition. These platforms can also facilitate two-way communication for sharing ideas, addressing concerns, and providing feedback. For certain parties who face challenges such as language barriers, cultural differences, educational levels, or SMEs, understanding the energy transition can be difficult. To truly establish a connection with these groups, face-to-face communication is the most effective approach.

5.3 Capacity Building

Addressing the issue of limited capacity is crucial for ensuring sustained stakeholder engagement. Capacity-building initiatives can be an effective solution to this concern. These initiatives could encompass training and coaching programs, sharing of best practices, securing additional funding specifically for capacity enhancement. Building capacity can not only improve the efficiency of how different stakeholders operate for reaching sustainability goals but also elevate their engagement level, as they feel more empowered and confident in their ability to contribute meaningfully. Furthermore, municipalities can provide support to overcome some capacity limitations. For instance, non-profit organizations often face personnel

and budget constraints due to their voluntary work. However, as municipalities have indicated, more budget has been allocated for ET. Municipality is therefore advised to allocate financial resources strategically and with clear priorities, guarantee that adequate support is available to mitigate such barriers. Tools like cost-benefit analysis can assist in making decisions about where to allocate funds for maximum impact. A transparent budgeting process can also foster trust among stakeholders, further enhancing their engagement.

6. Reflections

6.1 Limitations of the study

There are several limitations of the study. Firstly, the research was constrained by time, which may have impacted the depth and breadth of analysis possible within the timeframe. Secondly, the research was primarily conducted using only interviews. While interviews provide rich qualitative data, they may not fully capture the complexities and varied perspectives that other research methods could uncover. Furthermore, given that many of the interviewees were reached through municipal connections, it is plausible that these individuals were already motivated towards ET. As such, their responses may be skewed towards providing positive information, inherently affected by their personal, subjective opinions. Moreover, stakeholders such as schools, churches, and businesses were not adequately reached during the study. Their lack of response, whether due to non-receipt of invitation emails or unwillingness to participate, limited the breadth and depth of the data collected. Thirdly, the large group of residents has yet to be thoroughly investigated. This represents a critical stakeholder group that may offer unique insights and perspectives on the issues at hand. As such, the lack of their input may limit the comprehensiveness and applicability of the conclusions and recommendations. To mitigate some of these limitations, the next step in our research plan involves conducting a survey among the resident population. This will broaden scope of the research and provide more comprehensive data that brings insights to improve stakeholder engagement.

6.2 Future research

Future research should first concentrate on further understanding the complex dynamics within the large and diverse group of residents in LECs. The intricacy of this stakeholder group, which comprises various roles such as homeowners, who typically make decisions for sustainable renovations, and renters, who may possess a high intention for ET but are constrained by decision-making powers, poses a significant challenge. Detailed investigation into the factors that influence their engagement could accelerate ET and, thus, worth further investigation. Secondly, it is necessary to verify the findings of this study with a larger, more diverse sample to enhance their reliability. Longitudinal studies can provide nuanced insights into how stakeholder engagement evolves over time, and how changing circumstances may impact their engagement. Additionally, including other variables not considered in the current study could

offer broader perspectives. Lastly, it is also important is the examination of the impact of various engagement levels on the overall success of energy transition initiatives within the community. Exploring these dimensions would provide valuable insights for developing practical strategies and policy recommendations to facilitate more robust and effective stakeholder engagement in energy transition at the local level.

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Appendix

Appendix 1: All stakeholders in the case

Stakeholder	Type of stakeholder	Contact person	Function contact person	Email	Phone	Links
1 Municipality of Leidschendam-Voorburg	Municipality					
2 Vidomes	Housing coorporation					
3 Wooninvest	Housing coorporation					
4 Energy Common	Foundation					
5 Duurzaam Leidschendam-Voorburg	Foundation					
6 MKB Leidschendam-Voorburg	Professional Association					
7 Stedin	Network operator					
8 BKS-Beheer	Owners Association Management					
9 Van 't Hof Rijnland	Owners Association Management					
10 Newomij Vastgoed B.V.	Owners Association Management					
11 Symfonie Beheer	Owners Association Management					
12 Klein VvE Beheer	Owners Association Management					
13 VVE - Schout van Eijklaan I: 1-111	Owners association					
14 VVE - Schout van Eijklaan II: 113-239	Owners association					
15 VVE - Schout van Eijklaan III	Owners association					
16 VVE - Schout van Eijklaan IV	Owners association					
17 VVE - Caen van Necklaan 261 - 339	Owners association					
18 VVE - Caen van Necklaan 181 - 259	Owners association					
19 VVE - Caen van Necklaan 2 - 354	Owners association					
20 VVE - Burgemeester keijzerlaan 3-241	Owners association					
21 VVE - Caen van Necklaan 412 - 690 even en G372 - G410	Owners association					
22 VVE - Grashof 1 -111	Owners association					
23 VVE - Grashof 113-243	Owners association					
24 VVE - Grashof 245-317	Owners association					
25 VVE - Burg. Sweenlaan 15-57	Owners association					
26 VVE - Burg. Keijzerlaan 2-60	Owners association					
27 VVE - Burg. Keijzerlaan 62-180	Owners association					
28 VVE - Schout van eijklaan 106	Owners association					
29 Kapsalon Roos Verschuren	Business					
30 Wasserij de Beer	Business					
31 Restaurant Leising (either this or Restaurant San Wah)	Business					
32 Snackbar Stuut Snacks	Business					
33 Snackbar Rahma	Business					
34 Dirck 3	Business					
35 NH food	Business					
36 Dirk van den Broek	Business					
37 Benu Apotheek	Business					
38 Bridgehome	Business					
39 Drie molens kapsalon	Business					
40 Probike tweewielers	Business					
41 Restaurant San Wah	Business					
42 Dunea Warmte & Koude	Water company					
43 Tandarts de Jong	business					
44 Openbare Basisschool de Magriet	Primary school					
45 Veurs lyceum (650 students)	Secondary school					
46 Mbo rijland (must be large, lots of programs)	Secondary school					
47 s gravendreef college (1000 students)	Secondary school					
48 Partou Burgemeester Sweenlaan	Kindergarden					
49 Partou Burgemeester Roeringlaan	Kindergarden					
50 Vlietkinderen	Kindergarden					
51 Bibliotheek aan de vliet	Culture					
52 Kruisheuvelkerk	Church					
53 Optifex kerk	Church					
54 Heilige Maria en Papa Kyrillous VI kerk Leidschendam	Church					
55 Zwembad de fluit	Sport					
56 Sporthal de fluit (together with Zwembad)	Sport					
57 Jeu de boules vereniging grand cru 82	Sport					
58 LV Boxing	Sport					
59 Sport en welzijn	Sport					

Appendix 2: Interview template

Following the template for preparing interviews, including email invitation sent to the interviewees, questions with different themes that may address during the interviews.

Email

Beste _____,

Ik ben Xiao en ik werk als onderzoeker in energietransitie onderwerp. Wij zijn in samenwerking met de gemeente Leidschendam-Voorburg een onderzoek gestart over de stakeholders in de Amstel/Heuvelwijk binnen de energietransitie.

Het onderzoek sluit aan op het doel van de gemeente om de Heuvel/Amstelwijk in 2032 aardgasvrij te maken. Het doel van het onderzoek is om via verzamelde data over de

stakeholders een nieuwe manier te creëren om te zien wat de meest efficiënte route is om de energietransitie te versnellen. Bij alles wat gepubliceerd wordt over het onderzoek blijft u anoniem.

Wij de onderzoekers gaan interviews uitvoeren met de verschillende stakeholders.

Jij bent de contactpersoon-Stichting Duurzaam van gemeente Leidschendam-Voorburg en wij hebben interesse om je te interviewen over uw standpunten van de energietransitie. Het interview zal 30 tot 45 minuten duren.

Mocht u interesse hebben in een interview dan hoor ik dat graag zo spoedig mogelijk!

Ik kijk uit naar uw reactie.

Met vriendelijke groet,
Xiao

Kort intro voor het interview

Ik ben Xiao en universitair hoofddocent in HU. Ik werk nu samen met TU/e en HHS in het project duurzame en sociale lokale community (LEC). Op dit moment zijn wij in samenwerking met de gemeente Leidschendam-Voorburg gestart met een onderzoek naar de stakeholders binnen de energietransitie. Dit onderzoek sluit aan bij het streven van de gemeente om de Heuvel/Amstelveen in 2030 aardgasvrij te maken. Het doel van het onderzoek is om met de verzamelde data over de stakeholders tot een lokale energiestrategie te komen die het beste toepasbaar is binnen de Heuvel/Amstelveen. Om een succesvolle lokale energiestrategie te hebben, moeten we de verschillende belanghebbenden in deze energietransitie begrijpen. We zitten in de fase van het verzamelen van informatie om de profielen van stakeholders te begrijpen. We verzamelen informatie op twee verschillende manieren. We verzamelen data door middel van informatie die online te vinden is en data door het bevragen van de stakeholders door middel van interviews en eventueel enquêtes. De verzamelde data wordt in het kader van datamanagementbeleid binnen universiteiten op een kaart of dataset gezet. De kaart geeft een visueel overzicht van de Heuvel/Amstelveen en de dataset wordt gebruikt om de beste lokale energiestrategie te creëren en wordt gebruikt voor onderzoeksdoeleinden in dit project LES. De dataset over de stakeholders besteedt aandacht aan de houding, intentie en het gedrag van de stakeholders binnen de energietransitie. In alles wat er over het onderzoek wordt gepubliceerd, blijven de betrokkenen altijd anoniem. We staan in nauw contact met de gemeente Leidschendam-Voorburg voor elke stap die we nemen voor het onderzoeken van belanghebbenden in dit geval de Heuvel/Amstelveen en we zullen ook alle partijen op de hoogte houden van onze onderzoeksresultaten.

Voor het onderzoek nemen we dit gesprek graag op en gebruiken de transcriptie voor analyses, geeft u mij hiervoor toestemming?

Interview vragen

Topic 1: Core tasks

Wat zijn de hoofddoelen van het bedrijf?

Wat doen jullie (wat zijn jullie activiteiten)?

Welke functie heb jij binnen het bedrijf?

Wat zijn de hoofddoelen van jouw functie binnen het bedrijf?

Hoe denkt uw bedrijf over de energie transitie? Wat is jullie attitude over energietransitie.

Welke relatie heeft uw functie ten behoeve van de energietransitie binnen het bedrijf?

Topic 2: Stakeholder characteristics

- Wat zijn de kernwaarden van uw organisatie (dat wil zeggen, wat zijn de leidende principes, de ware essentie van uw bedrijf en waar het voor staat)? Welke impact streeft uw organisatie na? Waar zijn deze waarden zichtbaar in uw organisatie (b.v. in de missieverklaring, de strategie, de agenda, de manier waarop zij met werknemers/belanghebbenden omgaat, de manier waarop middelen binnen de organisatie worden verdeeld, enz.)

Andere manieren om materiaal te krijgen: Waar denken werknemers aan als ze aan deze organisatie denken? Waarmee identificeren zij zich?

- Wat is de kennis over energietransitie die uw bedrijf weet?

Denk je dat je veel weet? Dus is dit jouw expertise?

Krijg je veel informatie over energietransitie?

Hoe kom je aan de informatie?

-Wat is jullie motivatie achter jullie bedrijf?

Wat vinden jullie binnen het bedrijf echt belangrijk (Bijvoorbeeld omzet)?

Hoe kijkt u zelf naar deze waardes?

-Objectives: Hebben jullie al doelen voor de energietransitie, zo ja wat zijn deze?

Hoe sluiten jullie doelen, voorkeuren, motivatie en waardes aan bij de energietransitie?

Zijn er afwegingen tussen jullie doelen en het behalen van de energie doelen? (the answers could be possible challenges)

Heeft uw organisatie specifieke doelen en doelstellingen met betrekking tot de energietransitie? Hoe zijn deze doelstellingen geformaliseerd in uw bedrijf? Hoe verhouden deze doelstellingen zich tot de waarden van uw organisatie? En tot haar bredere doelen en belangen?

Op welke gebieden zou er volgens u meer afstemming kunnen zijn? Wat zijn de factoren die deze verschillen momenteel motiveren?

- agency: welke capaciteit heb je om de kracht en middelen te hebben om je potentieel te vervullen. (the answers could be possible challenges)

Wat is volgens u de actieradius van uw bedrijf om de energietransitie te vergemakkelijken/bijdragen.

Wat valt binnen het bereik, wat valt buiten het bereik. Wat zijn de belangrijkste beperkende factoren?

-behaviour: Wat hebben jullie al gedaan ten opzichte van de energietransitie?

-Gap Wat zorgt voor de verschillen (gat) tussen jullie doelen en uitvoering ten behoeve van de energietransitie?

Hoe doen jullie kennis op over de energietransitie en beste oplossing? Of wat kan er gedaan worden om de kloof te dichten?

Zijn deze uitdagend? Zo ja, waarom is het moeilijk? (challenges)

- interaction with other stakeholders

Hoe gaan jullie met jullie klanten om ten opzichte van de energietransitie?

Hoe communiceren jullie met jullie klanten?

Hoe is jullie samenwerking met de gemeente Leidschendam-Voorburg gericht op de energietransitie?

En met ander stakeholders? (VVEs, woners, BKS-Beheer, wooninvest, energy common, stedin, ander business...) Positive of negative (challenges).

Verwachtingen vs realiteit als jullie veranderingen willen toepassen bij jullie stakeholders.

Waar werken de stakeholders tegen en waar werken de stakeholders mee? (challenges)

Topic 3: Past present future

Merk je veranderingen in de doelen van het bedrijf ten opzichte van het verleden?

Krijg je mee wat de doelen zijn van andere stakeholders binnen de energietransitie?

Wat zijn hun verwachtingen?

Wordt er druk uitgevoerd op uw bedrijf om de energietransitie te laten plaats vinden?

Zo ja, waar komt deze druk vandaan?

Waar zie jij je projecten in relatie tot het energiesysteem heen gaan?

Wat zijn jullie belangrijkste uitdagingen toekomst gericht?

Appendix 3: Interview coding examples

The following screenshots from Atlas.ti are the coding examples show some of the codes for each stakeholder. There are different colors for different codes.

Note the coding will be provided upon requests due to privacy of various stakeholders.