



# Consultancy Report

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## Determining critical factors in the ATELIER Positive Energy District pilot in Buiksloterham

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This study aims to identify the essential processes in the upscaling of the Buiksloterham PED pilot in the context of upscaling the PED concept. The Amsterdam University of Applied Sciences (AUAS)identified two main challenges that lead to this research topic: conceptualizing the PED innovation and including and aligning stakeholders. To properly address these challenges, theories Multi-Level Perspective (MLP) and Strategic Niche Management (SNM) are used to both understand how PEDs are currently positioned within the energy transition and how PEDs can outgrow niche status. Moreover, literature on urban experimentation and upscaling is considered to put the whole system of the PED in a local perspective on urban developmental sites, including its social and technological aspects. From the literature, three processes were derived that are deemed important when upscaling in this context: learning processes, articulation of visions & expectations, and actor network formation. Activities are linked to these specific processes, that are important to fulfill when bringing a system such as the PED from the niche level to eventually the regime.

The methodological approach consists of desk research and interviews on the case of energy communities within the Buiksloterham PED. Both methods focus on deriving information on the current status of the three processes. However, the interviews also serve as a basis to gain insights on the opinion of the actors on these processes and activities, and how the actors think these processes could be improved. The desired side effect of the interviewees' knowledge articulation is that they are made to think about the processes themselves. As not only stakeholders from different organizations were interviewed, but also multiple stakeholders within the organization, the dynamics both between and within organizations were researched.

Six 'critical factors' for PEDs, in general, are deduced from the official ATELIER documents and interviews. These critical factors are processes deemed essential in the development of a PED:

- 1. Common goals and shared understanding are at the base of the vision of the project, a challenging distinction between commercial and non-commercial actors in a PED can be made when aligning these.
- 2. Initial network assembly is about the type of actors that should be included according to their competence in the project and accordingly what characteristics to focus on when assembling the actor network of a PED.
- Role of citizens is about defining citizens' function in the project, how to include them and 3. how to co-design the PED with them.
- 4. Active information spread and retention entail ways to deal with the vast amount of knowledge in the project, knowledge embedded in people in the project, and the nature of ATELIER meetings for knowledge creation and spread.
- 5. Learning by interacting is how a common workplace and interactive meetings can stimulate learning in the project.
- 6. Structured learning is necessary to transform data and first-order learning into second-order learnings which must be aggregated from individual experiences.

Additional to these six factors, an overarching factor is the flexible process structure, emphasizing that in each of the factors it is important to keep a dynamic view rather than a rigid one. These general PED critical factors are then applied in the context of this research. First, general recommendations applicable to each success factor are formulated. Since the factors are derived from the case of Buiksloterham, specific recommendations are formed for this PED. Next to these Buiksloterham specific recommendations, also specific recommendations on the energy community case are





provided to the stakeholders through an infographic that can be used at the kick-off of the energy community Innovation Atelier as a hands-on deliverable.



Applying the critical factors in future PED projects does not concern integrating the factors in existing processes like in Buiksloterham, but executing the factors from the very start of the project. Some factors are more relevant during the initiation of the project, while others become important during the execution or evaluation stage. The critical factors are therefore visualized in a 'PED-cycle', displaying at which point in time the implementation of the factors should be realized. The model should not be understood linearly. Alternatively, the model should be seen as a timeline in which the phases can overlap and are not so strictly bounded to the visualized position.





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List of acrony	ms
Acronym	Full name
ATELIER	AmsTErdam BiLbao cItizen drivEn smaRt cities
AUAS	Amsterdam University of Applied Sciences
СоА	City of Amsterdam
COVID-19	<b>Co</b> rona <b>vi</b> rus <b>d</b> isease 20 <b>19</b>
EU	European Union
KPI	Key Performance Indicator
MLP	Multi-Level Perspective
моос	Massive Open Online Course
PED	Positive Energy District
PSI	Paul Scherrer Institute
SNM	Strategic Niche Management
TNO	Nederlandse Organisatie voor <b>t</b> oegepast- <b>n</b> atuurwetenschappelijk <b>o</b> nderzoek
WP	Work Package





### 1. Introduction

European cities are mostly dependent on a centralized and largely fossil-fuel and nuclear-based power system, in which electricity is distributed to passive consumers (Martins et al., 2019). However, such a system has been proven to be both energy inefficient and unsustainable (Monstadt, 2007). Moreover, rising electricity demands throughout Europe, concerns about the security of European energy supply, and the rise of renewable energy sources are highly pressuring the current energy system, calling for a transition towards other energy system configurations (Altmann et al., 2010).

A promising challenger for the dominant centralized energy system is the construct of a Positive Energy District (PED), which is characterized by a more decentralized and local method of producing and consuming energy within urban areas (Alstone et al., 2015). A PED is an energy-efficient and energy-flexible urban area in which more energy is produced than consumed over a year, leading to a positive net energy balance (ATELIER, 2021). In such a district, local renewable energy sources are implemented, e.g. photovoltaics and micro-turbines (Ala-Juusela et al., 2016). In addition to technological innovations, a PED is characterized by social innovations. For example, a crucial aim within a PED is that citizens in such a district take on a participatory and central role by contributing to the energy production system, and create a common vision of living a sustainable life (Ala-Juusela et al., 2016). PEDs are thus complex and dynamic systems including both technological and social innovative components which are inherently intertwined and therefore constantly interacting with each other.

PEDs are an improvement over the current centralized energy system because it helps in achieving the goals of reducing Europe's carbon footprint, managing the energy transition and driving sustainable urban development (Bossi et al., 2020). However, large-scale diffusion of these systems remains to be observed (Bossi et al., 2020). Challenges in the development of the PED concept are finding appropriate business models, adhering to and changing current regulations regarding individual energy production, and involving stakeholders (Bossi et al., 2020). To stimulate the development of PEDs, the European Commission is actively aiding in the upscaling of local PED projects by providing monetary support through the Horizon 2020 program (Kugleta, 2013).

One of the PED projects funded by the Horizon 2020 program is the ATELIER project. This project will receive a subsidy of 19.5 million euros over five years (AUAS, 2021). Within these five years, the goal is to create PEDs in two lighthouse cities (Amsterdam and Bilbao), which can be defined as pilot projects set up to derive valuable lessons from (ATELIER, 2020b). Consequently, the pilots are to be replicated in six fellow cities (Bratislava, Budapest, Copenhagen, Krakow, Matosinhos, and Riga). The PED pilots in the lighthouse cities thus serve as experimental projects from which lessons should be extracted about the challenges concerning business models, legislation, and involving stakeholders during the development process. The subsequent goal is to replicate these lessons to the fellow cities. The project has taken off in November 2019 and is still in the start-up phase. Currently, challenges and actions are being defined that need to be undertaken to assure the successful development of PED systems in Bilbao and Amsterdam.

In Amsterdam, the municipality identified the district of Buiksloterham as the site to implement a PED system because of its desired uses for both industrial and residential purposes (ATELIER, 2021). As there were already plans to change the industrial character of North Amsterdam, a suitable location had already been identified. The houses that are currently being built are energy-efficient and new inhabitants are stimulated to think along to new sustainable ways of living to reduce energy consumption. The combination of citizens and companies within the district will constitute the community in which energy will be generated, exchanged, and consumed responsibly. As the project





involves numerous challenges in diverse fields, many stakeholders are invested in the Buiksloterham pilot, including fifteen local organizations and companies. These stakeholders are involved in a technical, social, coordinating, and/or evaluative way.

Among the stakeholders working on the PED pilot is the Amsterdam University of Applied Sciences (AUAS). The role of the AUAS in the project is to aid in the development and implementation of the 'PED Innovation Atelier' in Buiksloterham. The PED Innovation Atelier consists out of various actors and has been created to enable the city's actors to develop and deploy the PED, and to learn how to execute the innovative processes enabling the development of the PED in the specific context. Consequently, these lessons are to be transferred to PED Innovation Ateliers stationed in fellow cities (ATELIER, 2020C).

During the 1.5 years of development of the PED Innovation Atelier, the AUAS has encountered challenges in multiple areas. First, the experts working in the Innovation Atelier either have a technical or social background. Consequently, the team conceptualizes innovation processes as being either completely technological or social, making it difficult to recognize that societal and technological factors are inherently intertwined with each other. Accordingly, they struggle with conceptualizing innovation processes in a holistic and transdisciplinary way. Moreover, they encounter difficulties on how to include, connect and align stakeholders in the project, and how the innovation processes should be monitored and evaluated.

Since the AUAS team lacks precise knowledge about conceptualizing and structuring innovation processes within a PED, it is difficult for them to pinpoint which processes are most essential in the successful upscaling of a PED. Accordingly, this impairs AUAS's ability to extract and absorb the most valuable lessons from the experiment needed to scale up the PED pilots. Thus, this study first aims to provide AUAS with a structure to conceptualize the innovation processes within the PED project. Moreover, the goal of the study is to educate the team of AUAS on essential processes and activities enhancing the development of the Buiksloterham PED pilot and provide them with recommendations on how to learn about and improve on these processes. The final goal is to provide the AUAS with recommendations on how valuable lessons and knowledge about these essential processes should be transferred to the fellow cities, intending to scale up the PED concept. This leads to the following research question:

## Extra project info

The project of Buiksloterham is divided into ten parts or themes considered most essential for its success. Accordingly, to each theme a combination of stakeholders is assigned. These parts are called work packages (WPs). These work packages have been set up to integrate all the dimensions of the project (legal, social, technical, organizational). WP3 is the work package called 'PED Innovation Ateliers' and is seen as the core of the project. WP3 entails four different tracks: integrated smart energy and electro-mobility; systems governance, integrated planning and law; new financing methods; data, privacy & data platforms.

The scope of this research is limited to Innovation track 1: 'Integrated Energy Systems and Electro-mobility'. This track has been created to support the tailoring and implementation of smart urban solutions related to energy (systems) and electric mobility.



"Which processes need to be learned and which activities need to be undertaken by the actors within the Buiksloterham PED pilot to enhance effective upscaling of PEDs?"





To ensure the feasibility of a research project along these lines, the empirical scope of this study has been narrowed down to an intervention within the project of Buiksloterham. However, considering that the goal of the ATELIER project is to scale up PEDs distributed over various cities across Europe, geographical generalizability remains an important factor within this research. To preserve generalizability as much as possible, the socio-technical innovation processes within the case of energy communities within the Buiksloterham PED pilot are studied, since these are thought to be illustrative of the socio-technical innovation processes within PED projects. In this way, the client receives generalizable information while the research remains within the time limits of the student team.

Literature on transition theories, including Multi-Level Perspective (MLP) and Strategic Niche Management (SNM), is used to conceptualize the innovation process of the PED itself. To derive more specific processes, sub-processes, and key activities within the development of the PED, upscaling and urban experimentation literature has been studied and reviewed. Together, these strands of literature serve to answer the research question proposed above.

By answering the research question, the scientific contribution is twofold. First, the theoretical framework is a distinct and novel combination of various strands of literature whereby several concepts between the various strands are linked and integrated, thereby extending current theory. Second, a practical contribution of the research is made through the provision of an empirical example of learning mechanisms within the upscaling of urban energy experimentations promoted by the Horizon 2020 program. On a societal level, this research contributes to solving the challenges faced by the ATELIER project, thus aiding in the successful realization of the project itself and the sustainability goals accompanied with it. Moreover, by enhancing the way ATELIER extracts lessons from the ATELIER project, a further step is being made towards the knowledge base necessary for sustainable energy provision throughout Europe.

<u>The following section</u> provides a theoretical framework that captures the innovation processes and elaborates on more distinct literature regarding learning mechanisms within urban experimentation. <u>Section 3</u> discusses the methodology and provides the reader with information on the research design and the data collection. <u>Section 4</u> descriptively presents the attained results. In <u>section 5</u>, the results are synthesized, analyzed, and related back to the context of upscaling, whereafter recommendations are provided. <u>Section 6</u> and <u>7</u> conclude the research and discuss the implications and the limitations of the research, respectively.





### 2. Theoretical framework

The PED initiative in Buiksloterham is broad and has an unclear starting point, containing ten to twenty technological developments of which some already existed. These developments are related to smart heating, cooling, electricity, and electro-mobility (ATELIER, 2020b). The proposed set-up of a PED also vastly differs from how these products and services are currently provided. To properly frame this bundle of systemically related technologies and its relation to the current system, an equally broad and holistic theory is needed.

### 2.1 The Multi-Level Perspective

The current energy and e-mobility system configuration is an interdependent system of many social and technological elements, such as appliances and infrastructure, but also the standards and expectations that users and producers have of these technologies (Unruh, 2000). The stability of such an established socio-technological configuration is dependent on the organizational and cognitive routines that are built up over time (Geels, 2002). It could therefore be stated that the current energy and e-mobility system is a technological regime, which is defined as "the rule-set or grammar embedded in a complex of engineering practices, production process technologies, product characteristics, skills and procedures, ways of handling relevant artifacts and persons, ways of defining problems; all of them embedded in institutions and infrastructures" (Rip & Kemp, 1998). The energy and e-mobility regime is stable because an entire infrastructure and institutional environment is built around it.

While a regime is stable in principle, there are mechanisms that allow new configurations to influence the regime. PEDs are such a new configuration as they diverge from the currently synchronized system in both a technological and social manner. It could be stated that a PED is a niche, which is a protected space in which radical innovations can be developed and tested on a small scale (Geels, 2002). The PED requires further development before being viable for broader implementation in society and the concept is currently being developed in a protected space of EU-funded projects. The assumption that PEDs are a niche is applicable in this case, as the ATELIER project aims to learn from PED development to eventually roll out globally and replace current energy and mobility systems based on fossil fuels.

A theory related to such transitions is the Multi-Level Perspective (MLP) (Geels, 2002). The idea behind technological transitions within the MLP is that niches build momentum in its development, that external landscape pressures destabilize the existing regime, and that the destabilization of the regime creates a window of opportunity for the niche to influence or replace the regime (Geels, 2002). As the external landscape pressures on fossil-fuel-based regimes increase, a technological niche such as a PED can further develop and seize the window of opportunity created (Geels, 2014). According to the MLP, the PED needs to be developed in a space that is protected from market forces and where failure is permitted with the goal of learning. Due to the Horizon 2020 grant, the PED in Buiksloterham can be interpreted as a space protected from market forces with the goal of experimentation to further develop the niche. Figure 2 visualizes the theoretical context of the MLP in which the energy and e-mobility regime and PED niche are placed.







Figure 1. MLP context, SNM focuses on bottom-up niche development towards regime (Based on Geels, 2002)

### 2.2 Strategic Niche Management

Within the MLP context, a framework is required to structure the key activities to further develop the niche towards growth and stability, to the extent that market forces can be introduced to the niche. A suitable framework for this is Strategic Niche Management (SNM) (Kemp et al., 1998; Schot & Geels, 2008). SNM is a framework with factors that influence the progression of niche development. This fits in the MLP context of Figure 1, where SNM focuses on the development of the niche towards the new regime configuration. The SNM framework is especially focused on learning from experimentation to help innovations as the PED outgrow niche status and scale up to the regime level. The key processes that are most influential are *the articulation of visions and expectations, the formation of social networks*, and *learning processes at multiple dimensions*.

Visions are deemed contributing factors to niche development if expectations and visions are robust (widely shared), specific (enough to guide actions), and of high quality (substantiated by ongoing projects) (Schot & Geels, 2008). Social networks are most valuable for niche development if these are broad (wide group of stakeholders involved to broaden cognitive frame) and deep (involved parties mobilize commitment and resources) (Schot & Geels, 2008). Learning processes take place on multiple dimensions such as technical aspects, regulations, or societal effects. In addition, learning processes in niches should be directed to both first-order learning (accumulation of facts and data) and second-order learning (changing cognitive frames within a niche) (Schot & Geels, 2008).





### 2.3 Upscaling

Within the SNM framework, the PED in Buiksloterham can be regarded as a collection of technological and social niche innovations that are tested in an urban environment, making it an urban experiment. Urban experiments are defined as "urban sites devised to design, test and learn from social and technical innovation" (Fuenfschilling et al., 2019). An integral aspect of urban experiments is the extent to which it is replicable and scalable, which is often more difficult to achieve than assumed (Dijk et al., 2018). Hence, considering the upscaling process in the early phase of designing the experiment is helpful in the successful embedding of the lessons learned, accelerating the upscaling process (Scholl et al., 2018). The processes that will be important in the future for upscaling PEDs across the EU are therefore also important in the present for the design, implementation, and evaluation of the PED in Buiksloterham.

According to Kern (2019), upscaling urban experiments is a process over time that can be characterized by expansion, diffusion, and transformation. In this context, expansion is upscaling limited to the city in which the experiment was conducted, diffusion is upscaling between cities on a voluntary basis and transformation is upscaling that leads to a system-level transformation towards sustainability (Kern, 2019). In regional and national contexts, the focus of upscaling is often on expansion. However, in a multi-level governance system such as the EU, diffusion and transformation are important areas of focus. In multi-level governance systems, different types of upscaling exist which facilitate expansion, diffusion, and transformation. These types of upscaling are horizontal upscaling (transfer to similar contexts), vertical upscaling (to smaller contexts such as smaller cities and bigger contexts such as country- or EU-level), and hierarchical upscaling (to contexts which are lagging in development) (Kern, 2019). Since the Buiksloterham district is part of the lighthouse cities experiments, and the first step in upscaling will thus be the replication to districts in the six fellow cities, the most relevant level of upscaling in this stage of the niche development is horizontal upscaling. The positioning of this horizontal upscaling is displayed in Figure 2.



Figure 2. The different types of upscaling in the context of ATELIER.

In horizontal upscaling processes, there are horizontal linkages between the original experiment and





the new experiment which support the transfer of knowledge from one to the other (Peng et al., 2019). This is a challenge because the concrete structure and approach of urban experimentation projects are strongly shaped by local institutional arrangements (Raven et al., 2019). In this transfer of knowledge, the most important factor to consider is not the actual content of the experiment, but rather the context in which the lessons were learned (Peng et al., 2019). To transfer this type of knowledge from one context to another is called contextualization (Peng et al., 2019). To successfully contextualize knowledge, the focus of learning should be on 'process learning', bridging the practice of experimentation and second-order learning, as opposed to the simple accumulation of facts and outcomes inherent in first-order learning (Evans et al., 2021). The key learning processes on which this research focuses are therefore placed in the context of the horizontal upscaling of the PED in Buiksloterham. Thus, horizontally upscaling the concept of a PED consists out of learning from the experiment, and transferring these lessons to other cities and their context. The relationship between the PED in Buiksloterham, PEDs in fellow cities, and the energy and mobility regime is displayed in figure 3.



Figure 3. The relationship between the PED in Buiksloterham, PEDs in fellow cities and the regime.

In the broader context of the MLP and SNM framework, horizontal upscaling in urban experiments provides a specific goal for the key processes of the PED in Buiksloterham. This line of reasoning is summarized systematically in Figure 4.







Figure 4. The theoretical framework used for this research.

### 2.4. Key processes

Existing literature mostly uses the three core processes of SNM - *actor network formation, articulation of visions* and *expectations,* and *learning processes* - as a starting point for analyzing the upscaling of urban experiments. As the SNM processes are rather general, previous studies have concretized them to fit the context of upscaling (Dijk et al., 2018; Haugland & Skjølsvold, 2020; Naber et al., 2017). These concretized processes thus provide a good starting point for an operationalizable framework suitable for this study.

Upscaling processes are typically driven by project promoters, a central group of actors at the core of the project's actor network (Hermans et al., 2013). Within the three key processes, the literature identifies several sub-processes that need to be in place in the context of an urban experiment. To enable upscaling of an urban experiment, it is precisely these processes that need to be learned and that can be transferred to other contexts (Evans et al., 2021; Peng et al., 2019). The following subsections explain these sub-processes. Table 1 outlines concrete activities that need to be executed by project promoters to realize these processes. Apart from the literature on urban experiments and upscaling, the activities in Table 1 are also drawn from the literature on social network theory (Caniëls & Romijn, 2007), social constructivism (Borup et al., 2006), organizational change management (Bögel et al., 2019), experiential learning (Whalen & Paez, 2021) and development studies (Koster & van Leynseele, 2018), as some processes researched in those disciplines are very similar to sub-processes in upscaling.

### 2.4.1 Articulation of vision and expectations

The articulation of visions and expectations provides an experimentation project with legitimacy towards actors, justifying an investment of time and resources despite the unclear outcome (Ryghaug et al., 2019). Hence, the vision should be co-designed together with relevant project actors to ensure that it possesses enough legitimacy in the eyes of all parties needing to invest time and resources into the project (Matinheikki et al., 2017). Once the vision is set, it is important to allow for feedback mechanisms from preliminary project results and learning outcomes to ensure that it still fits the project. Otherwise, there is a risk that the vision could lose its function of providing legitimacy (van der Laak et al., 2007).

Next to the vision, project promoters need to ensure that expectations about future benefits of the project are articulated and shared across the project actors. Expectations particularly help reduce the uncertainty inherent in the innovation and experimentation process (Coenen et al., 2010). In an urban experiment, it is not just project actors that need to be convinced of future benefits, but also the public (Haugland & Skjølsvold, 2020). Hence, project promoters need to ensure that not only actors





possess concrete expectations on future benefits of the project, but also the general public, particularly those citizens who will be directly affected by the project, such as citizens living in the district where the experiment takes place.

### 2.4.2 Actor network formation

In urban experiments, local actors are crucial, since they possess specific knowledge deemed essential for executing and learning from experiments in a local context (Cloutier et al., 2015). Hence, project promoters should assemble a broad network of local actors that can provide all necessary knowledge and interpersonal linkages that are required to complete such a project (van der Laak et al., 2007). A function that project promoters should fulfill in the context of a local experiment is that of a knowledge broker (Hermans et al., 2013). Knowledge brokers are inter-organizational connecting actors and act as the "glue" in a network by enabling actors of different backgrounds to understand each other. Furthermore, once an actor network exists, project promoters need to engage in active management of the network to ensure efficient collaboration between actors and thus enable a high performance of the network (van der Laak et al., 2007).

### 2.4.3 Learning processes

Learning processes are of high importance in urban experiments aiming to contribute to sociotechnical transitions, as upscaling an experiment is highly dependent on the transfer of learnings from one experiment to other experiments (Scholl et al., 2018). A concept central to learning in urban experimentation contexts is that of second-order learning, which entails learning about underlying assumptions and alternative socio-cultural values (Evans et al., 2021; Hoogma et al., 2002). As selfreflection is a crucial tool for individuals to achieve second-order learning, project actors should provide spaces to foster these learning processes (Scholl et al., 2018).

Furthermore, learning about underlying assumptions and alternative socio-cultural values is of high importance as these processes will help actors to align the interpretative frames through which they view the experiment and, based on that, the problem definition that the project is tackling (Brown & Vergragt, 2008). These authors argue that alignment on those two levels is a prerequisite for finding common solutions for problems related to the urban experiment.

Additionally, the processes learned and applied in the experiment will eventually need to be embedded into the existing organizational structure of actors, implying that structured documentation and communication of these processes are necessary (Evans et al., 2021). Finally, it needs to be ensured that learnings made in the course of the project can feed back into project structures and plans, requiring constant monitoring and evaluation of the experiment to allow for quasi-real-time feedback and thus a fast cycle of learning and adaptation (Patel et al., 2017).

### 2.5 Conceptual framework

The three key processes of upscaling of urban experimentation as discussed in <u>section 2.4</u> form the backbone of the theoretical framework. These processes have been further defined and specified into sub-processes and activities. Table 1 displays the key processes, sub-processes, goals of the processes and the activities to be undertaken by project promoters.





Table 1. Key processes and sub-processes that need to be learned in an urban experiment and with activities that need to be undertaken by project promoters to do so.

17	C	C + I	A set of the second set of the second second
Key process	Sob process	Goal	Activities (project promoters)
formation	Driving actor network formation (Cloutier et al., 2015)	Ensure that the network contains all necessary actors	Include non-traditional and smaller actors to increase effectiveness and innovativeness (Dignum et al., 2020; van der Laak et al., 2007) Constant assessment of who should leave or join the network (Caniëls & Romijn, 2006)
	Managing the network (van der Laak et al., 2007)	Ensuring efficient collaboration and high performance	Creation of a dedicated network builder with the task of bringing actors together and organizing meetings (van der Laak et al., 2007) Monitor potential barriers of cooperation between actors (Caniëls & Romijn, 2006) Ensure that individuals are not isolated within their own organizations but have a network on their own to capitalize on (van der Laak et al., 2007)
	Brokering between actors of different organizational and educational backgrounds (Hermans et al., 2013)	Effective collaboration between actors of different backgrounds	Build close personal and professional connections with actors of different backgrounds (Koster & van Leynseele, 2018) Transmit information between actors and translate information to the language of actors (Caniëls & Romiin, 2007)
Forming visions and articulating expectations	Creating a shared vision (Dijk et al., 2018)	Provide the vision and the project with cognitive and socio-political legitimacy and align stakeholders	Co-designing the vision instead of passing it down (Matinheikki et al., 2017) Creating a shared culture and setting up shared goals between the parties (Matinheikki et al., 2017) Distributing roles equally to inhibit high-power actor formation (Matinheikki et al., 2017)
	Maintaining a shared vision (Dijk et al., 2018)	Preserve the socio-political legitimacy of the vision and the project, and the alignment of stakeholders	Create inter-organizational coordinating bodies (Matinheikki et al., 2017) Create a common workplace to support consistent interaction (Matinheikki et al., 2017) Prevent the vision from becoming rigid by scheduling specific meetings across actors to allow learnings from experimentation to feedback expectations (van der Laak et al., 2007)
	Create solid and trustworthy expectations (Coenen et al., 2010)	Increase the legitimacy- creating effect of the formed expectations	Formulate tangible expectations, which are not just promising ideas but backed by research and earlier experiments (Coenen et al., 2010) Formulate specific expectations, which are not just sketches, but enable falsification and definition of the next steps in the project (Borup et al., 2006)
	Forming public expectations through public showcasing (Haugland & Skjølsvold, 2020)	Increase public acceptance of the PED and create value for the public	Stage public trials to show the general public and policy makers what to expect from the project (Haugland & Skjølsvold, 2020) Organize public hearings to give the public the chance the participate in decision-making processes (Haugland & Skjølsvold, 2020)
Learning processes	Developing a shared understanding of symbolic meaning, interpretative frame, and problem definition among project participants (Brown & Vergrant 2008)	Bringing project participants into a position to find a common solution to the problem	Provision of a neutral and safe space in which participants can openly express their views and learn about each other's views (Culwick et al., 2019)





		Ensure that participants understand each other's terminologies (Culwick et al., 2019) Ensure that network actors have congruent worldviews and initial interpretative frames (Brown & Vergragt, 2008)
Enable self-reflection for project participants to engage in second-order learning (Scholl et al., 2018)	Completion of second-order learning processes in project participants	Engagement in self-reflection by project promoters themselves to ensure a level of learning high enough to enable others to learn (Bögel et al., 2019) Apply learning frameworks that foster second- order learning processes in experiential processes, such as the Reflective Learning Framework (RLF) (Whalen & Paez, 2021)
Focus on project processes that need to be embedded in existing organizational structures (Evans et al., 2021)	Documentation and communication of processes that need to be learned by project participants	Formalize collections of individual experiences into higher-level processes (Evans et al., 2021) Experimental, intentional deviation from existing processes and project management approaches and re-embed successful experiments into existing processes and management practices (Bresnen et al., 2004)
Constant monitoring and evaluation of the project, feeding back into project structures, ambitions, and plans (Patel et al., 2017)	Quasi-real time feedback to enable fast implementation and verification of learnings	Evaluation of KPIs themselves instead of mere evaluation of outcomes based on KPIs (Patel et al., 2017) Constant iteration of the decision making → monitoring → assessment → new decision process on micro and higher levels (Williams & Brown, 2014)

In an urban experiment, the processes of articulation of visions and expectations, social network formation, and learning do not happen independently of each other but are strongly interconnected (Naber et al., 2017). For instance, the strategy suggested by Brown & Vergragt (2008) to facilitate the emergence of a common language between actors of different backgrounds relates to the brokerage and knowledge creation function that project drivers should contribute to through their place within the actor network (Hermans et al., 2013). In turn, knowledge brokers can help in articulating knowledge demands and facilitate the linkages in the network to meet this demand (Hermans et al., 2013). Similarly, to agree upon common visions and expectations for the project (Dijk et al., 2018), project promoters need to engage in second-order learning to agree on layers such as interpretative frame and problem definition (Brown & Vergragt, 2008).

Generally, the interrelations between these concepts show that the articulation of visions and expectations and network formation direct and enable second-order learning. Second-order learning in turn causes expectations and networks to be adjusted. Second-order learning is also self-reinforcing because it causes the project promoters to critically review learning outcomes and Key Performance Indicators (KPIs). An overview of the interplay between the processes can be found in Figure 5.







Figure 5. The dynamic interaction within and between the key processes of upscaling.

Finally, the lessons learned in the Buiksloterham PED will be used to formulate and adjust expectations, actor networks, and learning goals for future PEDs through horizontal upscaling. Hence, a framework designed to identify strategic activities to upscale PEDs must consider both the interplay between and interdependence of the three different key processes and how these can be transferred to other cities. The framework is displayed in Figure 6.

Summarizing the previously outlined literature and theoretical considerations, it can be concluded that horizontal upscaling of urban experiments highly depends on process-based learning (Peng et al., 2019). This means that to successfully transfer an urban experiment like the PED in Buiksloterham, project promoters need to learn about the processes, sub-processes, and activities as outlined in Table 1, as those are what need to be transferred to other contexts rather than outcomes or KPIs of the project. As the sub-processes and activities in Table 1 are still generic for urban experiments and not tailored to PEDs or the Buiksloterham project, empirical research on the concretization of these processes and activities towards the project-specific context is needed and will be presented in the following sections.







Figure 6. The process of learning in horizontal upscaling of PEDs.





## 3. Methodology

This study aims to provide AUAS with actionable recommendations on which processes and activities need to be undertaken to enhance the effective upscaling of the Buiksloterham PED pilot. In this research, both the *presence* and the *quality* of the processes and activities that theoretically need to be executed to horizontally upscale urban experimentations were identified in the PED pilot of Buiksloterham. At the same time, these activities were tested against their actual relevance in the context of a PED, and additional key activities and processes were identified. As a result, additional activities and processes aiding in the upscaling of Buiksloterham were researched. Doing so, recommendations were provided based on activities and processes derived from the literature, combined with empirical research on which additional activities could be helpful.

The following section elaborates on the research design. Afterward, the individual aspects of the research process are specified, with the focus on how and why the linkages are formed between these aspects. In addition, the data collection approach including the sample is elaborated upon, and operationalization of the concepts is presented. At last, an explanation for the chosen data analysis approach is given.

### 3.1 Research design

As the goal of this research was to provide actionable recommendations to the client, a research method was required that enabled tangible and in-depth insights from a complex project. The research design most suitable to provide this was a qualitative case study. A case study consists of an intensive examination of a single case, providing detailed information on the complexity of the project (Yin, 2009).

The case that has served as the subject of this research is the intervention "Establishment of local energy communities with market access" (ATELIER, 2020b). It is a case covering a topic that is put in motion at the time of writing in innovation track 1 "Integrated smart energy systems and electro mobility" within WP3. The focus, in this case, is on how citizens organize themselves to become a collective player in the energy market. An important research focus has been set on the notion of energy citizenship, which is defined as 'a view of the public that emphasizes awareness of responsibility for climate change, equity and justice (...) and, the potential for (collective) energy actions.' (Murphy, 2012, p. 71) Different local energy communities already exist within Buiksloterham, namely De Ceuvel and Schoonschip. These communities use a platform for energy trading that will be developed further. Additional energy communities are to be created next to the existing communities (ATELIER, 2020b).

This case was selected because of its transdisciplinary nature. Among others, social, technical, and managerial disciplines were included in the topic of energy citizenship, which is representative of the whole PED pilot in Buiksloterham. Since the alignment of the stakeholders working on different fields of the ATELIER project was one of the main challenges for AUAS, this case served as a good example of how to align parties with different backgrounds. Therefore, this case was seen as a typical case representative for the larger context (Yin, 2009).

### 3.1.1 Research steps

To gather the data and make such recommendations, the research process as shown in Figure 7 was followed. As a preparation for the interviews, the theoretical framework was further operationalized to serve as input for the interview guide. Next to that, desk research consisting of document analysis was done to gather initial information about the relevant parties involved in the development of the







Figure 7: Structure of research process.

case. Using this data, a map was created containing all the relevant stakeholders involved in the case. The stakeholder map serves as an overview of the case and provided contextualized input for the interview guide. Therefore, the theoretical framework provided the content for the interviews, and the stakeholder map provided the context.

While this initial analysis is a helpful overview of the actors and their normative stances in the project, interviews allowed more in-depth, personal, subjective, and topical insights (Lofland & Lofland, 1995). These functionalities render interviews an appropriate measure to identify which processes are currently missing or are insufficiently developed, thereby contributing to the research goal. The interviews were conducted complementary to the insights gained from the desk research. Moreover, respondents provided additional information documents representing their perspective, leading to a methodological feedback loop (Bryman, 2016). Therefore, these methods were not used independently from each other but were constantly intertwined. The interviews were held in a semi-structured manner by following the theoretical framework as a guideline, but leaving room in the interviews for further elaboration on topics of interest (Wholey et al., 2010). The interviews have been transcribed and coded to highlight the presence and quality of the predefined theoretical processes and activities and to identify additional important activities. Afterward, the analysis consisted of an assessment of these processes and activities, and a comparison of the current situation with the





desired situation of these processes and activities. The desired situation in the analysis was twofold: there was a practical desired situation listed within the ATELIER project plan and elaborated about by the interviewees, and there was a theoretically desired situation in the form of the theoretical framework (Table 1). Identifying the differences between these normative projections and the current situation resulted in aspects of improvement.

To identify appropriate recommendations, several information sources were exploited: First, the PED experiment "MAKING-CITY" - a pilot project that is very similar to ATELIER in terms of scope, goal, and mission but has already advanced further in their project timeline - was analyzed. This project serves as a source of potential activities and processes to be implemented within ATELIER, as the experiment has already progressed past ATELIER's current project stage and needed to find solutions for of issues similar to those ATELIER. Appropriate recommendations were identified through the study of publicly available reports of the project and interviews with key actors in the project. Second, ATELIER actors themselves provided ideas on how to improve certain processes during the conducted interviews. Finally, academic literature on how to augment the quality of processes taking place in ATELIER has been analyzed. Hence, the recommendations provided to ATELIER originate from a mix of sources to produce suggestions most aptly and comprehensively possible.

### 3.2 Data collection

### 3.2.1 Document analysis

As a starting point for the document analysis, three internal ATELIER documents describing the project plans were analyzed. These documents consisted of a general project plan for the entire ATELIER project, a more elaborate document on WP3, and the first reflection report on WP3 (ATELIER, 2020b, 2020a, 2020c). The required documents about ATELIER have been

# Feedback from stakeholders

To ensure that any assumptions or recommendations were valid, they were thoroughly tested with, and verified by, the client and other stakeholders. The research process, progress, and findings have been discussed with the client in weekly meetings. The client also established a core group of important stakeholders that provided feedback on the content of the draft report. At last, feedback and suggestions were collected from a wider audience during the final presentation, which served as input for the final details of the report.

To ensure the academic quality of the research, weekly feedback sessions were attended. In these sessions, fellow students provided peer feedback and an academic supervisor provided additional insights. When faced by unexpected challenges, provisional feedback was given by the same supervisor throughout the week by e-mail or ad hoc meetings.

provided by the client. The ATELIER documents were used for an overview of the stakeholders in the project, learning objectives, and deliverables. The documents were complemented by project websites owned by ATELIER or the stakeholders, press releases, and news articles in which visions and/or expectations are articulated by the stakeholders of the case. The search terms for external documents regarding the stakeholders were "[organization name]" + "ATELIER PED". The interview contact for the MAKING-CITY project was also made possible by the client.

### 3.2.2 Semi-structured interviews

Additional data regarding the opinions and views of relevant stakeholders have been gathered by a series of semi-structured interviews with 13 stakeholders that were involved in the case. 13 interviews were conducted because this yielded sufficient theoretical saturation on different perspectives on the case (Guest et al., 2006) while remaining feasible to conduct within the given time frame. These stakeholders were initially identified based on indications provided by the client and publicly available





reports in which important stakeholders are mentioned. Interviewees within the stakeholder firms were selected through purposive sampling after the initial stakeholder map was shaped, based on their level of inclusion within the intervention and their role in the project (Given, 2008). This sampling method ensured that the interviewees were aware of both the content and context of the project (Bryman, 2016). The focus was set on interviewing parties with different roles within the project, namely a coordinating, executive, or representing role. When conducting the interviews, the interviewees were asked to address other parties relevant to the case. This snowball sampling method either reaffirmed or expanded the initial interviewee group with other stakeholders that were deemed sufficiently relevant in the case to be interviewed (Noy, 2008). All interviews were conducted online via Microsoft Teams and lasted between 1 and 1.5 hours. Although the preference would have been to conduct face-to-face interviews (Irvine et al., 2010), practical issues prevented this. The spoken language was English on all occasions. To adhere to research ethics (Israel, 2014), the interviews remain undistributed and the insights are only presented anonymously.

### 3.3 Operationalization

To be able to analyze and recommend the key activities and sub-processes, the activities and concepts within the sub-processes derived from the literature have been operationalized. An overview of this process is placed in the operationalization table, which can be found in <u>Appendix 1</u>. Moreover, questions based on the desired executed activities have been added to the table to give a guideline to the semi-structured interview guide, which can be found in <u>Appendix 2</u>. In this way, an overview of all the required information has been established, in combination with questions suitable to derive the required information. An example has been given in table 2.

Processes	Activities of project promoters	Operationalization	Possible interview questions
Learning	Formalize collections of individual experiences into higher-level processes (Evans et al., 2021) Experimental, intentional deviation from existing processes and project management approaches and re-embed successful experiments into existing processes and management practices (Bresnen et al., 2004)	Efforts to derive collective learning from individual experiences Active management of project processes Conscious of learning and development of processes in the project	Can you explain to me how you designed the learning processes you are using in the project? Did you take an effort to include the experiences of individuals in shaping these processes? How does the re-evaluation of your processes look like? To what extent would you deem the processes you use within the Buiksloterham project as compatible with the processes of your organization? Which barriers do you see in moving the Buiksloterham processes to your organization? How could those barriers be overcome? Have any processes of Buiksloterham already been embedded into your organization?

Table 2. Overview of the operationalization and interview questions of key activities.

### 3.4 Data analysis

The data analysis concerned analyzing the data attained through the conducted interviews and the desk research. To analyze the interviews, the interviews have been transcribed and coded using a coding process derived from grounded theory (Strauss & Corbin, 1997). This coding process was used because it allows identifying processes that were in general found to be present or missing based on the data provided by the interviewees. This process entails open, axial, and selective coding, with the addition that the previously derived theoretical framework served as the pre-existing structure for the codes. This method maintained the inductive nature of this research while simultaneously providing a theoretical framework that has served as a basis for the eventual recommendations. Within this framework, quotes from the interviews were labeled individually and were abductively connected to the concepts from the framework. If quotes were deemed to be unfitting in the theoretical framework, these were labeled and structured outside of the existing codes. This is the





open coding step, which was executed by researchers independently using the coding software NVivo. Although the framework ensured consistency in coding throughout this process, the first interview has been coded collectively to minimize methodological differences between researchers. In addition, codes have continuously been compared between researchers to maximize inter-coder reliability (Silverman, 2010). Wherever possible, quotes within concepts were connected after the open coding had taken place, which constituted the axial coding step (Strauss & Corbin, 1997). In the selective coding step, the analytical core concepts were mostly already given through the theoretical framework, thus codes were matched to the fitting concept in the framework. However, the researchers were open to new concepts arising from interviews not considered in the theoretical framework. In the end, the coding tree consisted of 394 nodes with 596 references and can be found in <u>Appendix 3</u>. The coding tree is structured in the following manner:

- 4 level-3 codes: three core process codes and one general code.
- 28 level-2 codes: sub-processes or aggregate codes.
- 177 level-1 codes: theoretical activities or insights that could not be structured within the theory, such as ideas or examples.
- 185 level-o codes: references to how theoretical activities are fulfilled.

When the coding process was finished, a narrative regarding the aggregate findings in the interviews was written that related the structure of the generic theoretical framework to the actual case of the PED in Buiksloterham. The narrative was then complemented by, and compared to, the normative ATELIER project plans from the documents and the theoretical framework. The narrative was shared and discussed with the client to minimize ambiguity throughout the narrative. Based on the narrative on the one hand and the formal ATELIER project plan and the theoretical framework on the other hand, processes that are lacking or are poorly executed in the current realization of the ATELIER project were identified. In doing so, the theoretical framework was complemented by processes and activities that arose from the interviews but could not be identified through the initial literature review. Lastly, the sources for identifying appropriate recommendations for the ATELIER project were consulted. This resulted in recommendations given on which processes and activities need to be improved to enhance the effective upscaling of the PED pilot in Buiksloterham, including suggestions on how to do so.





## 4. Results

This section contains results on the current nature of the three core processes of urban upscaling as outlined in <u>section 2.4</u> – *Formulation of visions and expectations, actor network formation*, and *learning processes* – in the ATELIER project in general and in the energy community intervention specifically. All results presented in this section are derived from analysis of ATELIER documents and interviews with actors in the Buiksloterham PED pilot. During the interviews, it became apparent that not every interviewee was extensively involved in the energy community intervention. During these interviews, the interviewes have provided insights on the larger PED project instead. Since not only information on the case itself, but information regarding the larger PED project is also of interest to the AUAS, both information streams have been processed in the results.

### 4.1 Actor network formation

### 4.1.1. General

According to the ATELIER project plans, the ATELIER project initially consisted of a group of 30 participants, based in the Netherlands, Spain, Germany, Switzerland, and the countries in which the fellow cities are located (ATELIER, 2020b). The participants are different, such as city authorities, research institutes, universities, and industry. The actors within the Buiksloterham pilot consist of all actors located in the Netherlands, along with several actors from other countries. These actors all have a certain role within the local energy community intervention. These actors, with their respective roles within the ATELIER project and local energy communities, based on the original project plan, are displayed in Figure 8 (ATELIER, 2020b).



Figure 8. Actor network based on ATELIER project plan.





### 4.1.1 Driving actor network formation

The formation process of the ATELIER network took place rather informally, through existing personal connections and pre-existing network structures. The project was initiated by actors who already knew of each other and had already collaborated before, whereafter the network expanded through other personal connections or organizations that existing actors were aware of; identification of partner cities similarly took place. As stated in interview 2, "*It is to some extent a coincidence of how the consortium looks like".* Hence, there was no structured search or application process to identify new ATELIER network members or partner cities.

Multiple interviewees agreed that including actors who are already experienced in developing similar projects in ATELIER is an intelligent approach to take: "*So you need somebody who's had a lot of experience in this area [PEDs]*" (Interview 8). Nevertheless, situations in which knowledge within the network is missing will occur. In this case, contracting external experts with specific expertise on the topic in question could be a solution as indicated in interview 1, as increasing the size of the network would come with the risk of rendering it unmanageable. Interviewees 2 and 6 confirm such a process, by stating that actors join because of encountered missing competencies instead of the other way around. The interviewees describe the process of (experienced) actors joining or leaving the network as an unstructured process (Interview 2), in which approval of actors joining is often an informal process based on feelings (Interview 6).

Clarity is missing on the role of citizens in the PED, as the housing complexes are still under construction and are still uninhabited. In the case of Republica in particular, it is unclear to which extent citizens have been onboarded on the fact that the building forms part of the PED and whether they are at all interested in the concept, or whether they will rather perceive it as a nuisance.

### 4.1.2 Managing the network

The importance of close collaboration between different organizations was stressed multiple times across different interviews. To this end, an important role is played by the Innovation Ateliers (WP<sub>3</sub>), as they were specifically set up to bring different actors together to be able to combine knowledge and learn from each other (Interview 2). One organization – TNO – is specifically responsible to set up these Innovation Ateliers and ensure that they are managed in a way that fosters collaboration and leads to a coherent frame under which actors can work together efficiently (Interview 2). Furthermore, other organizations also incorporate the role of a connecting and bridging body between other inter-organizational colleagues (Interview 8).

In larger organizations that are part of the network, it needs to be ensured that the project is known within the entire organization and that relevant departments have been involved according to Interviewee 9. Otherwise, the effectiveness of that organization might be hampered as not all departments that are needed to contribute are aware of the project. As Interviewee 9 put it, "*it would have helped us if the sustainability department was a lot more involved from the beginning."* This process can by itself be time-consuming. Another interviewee states that not everybody is up to date on the progress of their colleagues: "*it is a challenge to keep track of what everybody is doing"*.

Additionally, it should be noted that ATELIER consists of both commercial and non-commercial actors that might have diverging interests, as commercial actors strive to make a profit off their participation in the project. Furthermore, the modus operandi of EU projects involving extensive formal reporting and evaluation is quite different from processes in companies, which can also produce issues for commercial actors.

Moreover, ATELIER encounters difficulties in the collaboration with smaller and less-professional actors. For example, Interviewee 9 states that smaller actors "sometimes struggle with reporting and





with update meetings, since they are used to doing the actual work". Moreover, less-professional actors as citizens could find trouble in being part of an EU-guided and mission-oriented project: "If the EU has such big ambitions, its needs to be workable for non-professional parties like citizens. They are not going to report to the EU etc. I think that is a big thing that we need to address" (Interview 9).

### 4.1.3 Brokerage

During the interviews, questions were asked about the actor network. The insights interviewees provided were used to construct a new actor network map. This new actor network is displayed below in Figure 9. What is striking between Figure 8 and 9 is that not all coordinating bodies of the project have a linkage. Also, there seems to be no connection between the existing and the new energy communities. One actor that is missing from the stakeholder map is the citizens. These citizens were not mentioned when actors named the stakeholders they are involved with. However, there is indirect contact through the energy communities.



Figure 9. Actor network based on interviews.

Different organizations and individuals act as brokers in the energy communities intervention. It is notable that while some of them were formally appointed to this role, others were not. For instance, while AUAS was formally appointed to act as a bridge between stakeholders, Spectral was not but still acts as a broker on technological topics. Those that were not appointed tended to obtain the brokerage role intrinsically due to the position of the organization in the overall network. The broker roles are visualized in Figure 9, where especially AUAS and Spectral have central positions and interact with other organizations on a coordinating, social, technological, and monitoring level. However, despite all brokerage efforts, multiple interviewees agreed that the project is too big for individuals to always have a clear overview of what is happening within one work package, let alone multiple work packages. For example, interviewee 8 stated that it is "very difficult to manage and keep on top of what everybody's doing, and bring together people that are working in a similar area".

Despite the existence of various bridging stakeholders, it is stated that "bridges between work packages are very limited" (Interview 10). This is reasoned to be due to the way actors are working





within the project: "One of the main challenges that we have at the moment is the silo working mentality of the different partners within the project." One of the main barriers is that sharing information is not a daily way of working for many partners.

Other aspects that were stressed as being important in bringing different organizations together were physical meetings and brainstorming sessions. Multiple interviewees stated that the COVID-19 situation made it difficult to build up a strong connection with individuals from other organizations, leading to less efficient idea exchange and collaboration.

Table 3 summarizes the findings above and explicitly links them back to the activities described in the theoretical framework.

Sub process	Theory	Reality
Driving actor network formation	Include non-traditional and smaller actors to increase effectiveness and innovativeness	More experienced actors are included
	Constant assessment of who should leave or join the network	<ul> <li>Network assembly is an unstructured process</li> <li>No constant assessment of who should leave or join</li> <li>Missing competencies drive changes in the network</li> <li>Actors join through an informal process based on feelings</li> </ul>
		Role of citizens is unclear
Managing the network	Creation of a dedicated network builder with the task of bringing actors together and organizing meetings	<ul> <li>Innovation Ateliers as structure connecting actors.</li> <li>TNO as a formally appointed organization that facilitates, connects, and coordinates.</li> <li>Other informal connecting organizations</li> </ul>
	Monitor potential barriers of cooperation between actors	<ul> <li>Diverging interests between commercial and non-commercial organizations hampering collaboration.</li> <li>Collaboration with smaller and non- professional organizations is difficult. Due to:</li> <li>Work style differences between bigger and smaller actors</li> <li>Disharmony between EU-guided projects and non-professional actors.</li> </ul>
	Ensure that individuals are not isolated within their own organizations but have a network on their own to capitalize on	<ul> <li>Departments of organizations not aware of the project</li> <li>Colleagues not up-to-date on others activities</li> </ul>
		competencies
Brokering between actors of different organizational	Build close personal and professional connections with actors of different backgrounds (Koster & van Leynseele, 2018)	COVID-19 hampers strong connections
and educational backgrounds	Transmit information between actors and translate information to language of actor (Caniëls & Romijn, 2007)	<ul> <li>Both formally appointed and central actors act as brokers</li> <li>Project too big to know everything</li> <li>Silo-based working impairs knowledge transmission</li> </ul>

Table 3. Comparison between theory and reality in the process of actor network formation.





### 4.2. Forming visions and articulating expectations

### 4.2.1 General

When asked about their vision on the intervention of local energy communities, the PED in Buiksloterham and the entire ATELIER project, interviewees gave quite different answers. Some interviewees described the local energy communities to find out "*how [citizens] can adjust their behaviors in a more positive energy way"* (Interview 10), while others want to "*bring technologies to the market"* (Interview 4). At the ATELIER level, this contrast is also visible as some interviewees focus on cutting carbon emissions, while others see the project to influence the mindset of society (Interview 8 & 10).

### 4.2.2 Creating a shared vision

In the creation of a shared vision, interviewees agreed that co-designing the vision helps in sharing the same vision across all parties. Multiple interviewees indicated that they realized the importance of having a common goal, especially in a huge project such as ATELIER. Some interviewees had a broad interpretation ("There are overarching goals ... it could be climate mitigation, or it could be welfare or anti-poverty", Interview 3) and some more focused on the intervention ("We need to have a common vision on what the energy community needs to do and what the public, economic and individual goals are", Interview 5). While this realization is present, there were multiple interpretations of how the vision should be co-designed. One interviewee indicated that "it is essential to ask the community members: what is going to help you and how will this community be defined?" (Interview 2), while other interviewees argued that collectively defining and evaluating KPIs helps to align the vision on the project. This shows the friction in the creation of a vision in the local energy communities because ideally, the citizens themselves should create a vision together with the project promoters (Interview 2 & 5). However, no citizens are living in the new test sites Republica and Poppies yet, making it hard to engage with them. Therefore, the vision of the local energy communities is also created from a top-down approach by some stakeholders. The project coordinators are therefore in "a constant struggle" (Interview 2) between stakeholders with a very clear vision based on their own goals and the 'future vision' of a community that does not exist yet. These problems have been known to the project promoters for a long time now, but it is hard to find a solution.

Regarding the goals within the project, interviewees state that goals are not reached solely but are shared among actors (Interview 6). Further, there should be engagement between all the work packages, in which there is co-ownership of project aspects. An example is co-ownership of the monitoring and evaluation parts of the project (Interview 3).

#### 4.2.3. Maintaining a shared vision

While the visions are not entirely shared yet, the stakeholders realize that visions about the project should be managed once they are defined more clearly. Interviewees also realize that visions are "dynamic and might also be altered given the changes over time" (Interview 2). The project coordinators are seen as an important factor in ensuring that the vision is reflected upon actively by bringing stakeholders together. A limiting factor that multiple actors identify is the rigidity of an EU project where the 5-year plan must be made in the proposal, causing a lack of flexibility and adaptivity, and often the thought to "just follow the work program" (Interview, 3). While clear-cut planning does give guidance and structure, it takes away from the flexibility that is wanted and needed for innovation (Interview 13).





As elaborated above, interviewees state that COVID-19 interferes with effective communication and meetings on-site. Moreover, the creation of a common workplace could not be a possibility during these times. Earlier experiences with a common workplace have been very positive, as said in interview 12: "It worked really, really good. Because you catch a lot of small things in the hallways and stay connected to one another during things like a lunch break".

### 4.2.4. Creating solid and trustworthy expectations

Expectations about how to design local energy communities are very important for the legitimization of the project. To make these expectations trustworthy, an interviewee indicates that they are based on "*existing communities or participants within the PED boundary*" (Interview 2), and that expectations should be "*brought into the context of what is legally and technically feasible*" (Interview 2). Another interviewee argues that the expectations also need to be made tangible at some point, to derive a course of action (Interview 1). In concordance with the visions, interviewees indicate that expectations also differ based on incentives and are not always clear: "*Expectations should be linked to the citizens. But what is the role of the citizens? For me, that's not clear*" (Interview 8). Interviewees indicated that discussing expectations is important in developing expectations: "*We found out that it is really interesting to talk to each other and also to find out that other people's expectations could also fit our expectations and change it a little bit."* (Interview 6).

### 4.2.5. Forming public expectations through public showcasing

In the formation of public expectations, interviewees indicate that the intention is to include citizens in the creation of visions and expectations (Interview 2 & 12), and perhaps even to include citizens in the decision process (Interview 12). The municipality is mentioned as an important stakeholder in this process. Moreover, the municipality could play an important role in communicating expectations to policymakers (Interview 2). However, interviewees indicate that there has been no communication with the public yet (Interview 5). A reason for this can be that the interviewees think that the concept should be proven and ready for implementation before presenting it to the public (Interview 1). Again, this shows the friction between the top-down and bottom-up approaches used for creating visions and expectations.

Table 4 summarizes these findings and explicitly links them back to the activities described in the theoretical framework.

Subprocess	Theoretical activities	Reality
Creating a shared vision (Dijk et al., 2018)	Co-designing the vision instead of passing it down (Matinheikki et al., 2017)	<ul> <li>Actors realize the importance of shared vision</li> <li>Friction between designing the vision</li> <li>Role of citizens is crucial</li> </ul>
	Creating a shared culture and setting up shared goals between the parties (Matinheikki et al., 2017)	<ul> <li>Goals are shared</li> <li>Work packages lead to silo-based working</li> <li>Should be co-ownership of project aspects</li> </ul>
	Distributing roles equally to inhibit high-power actor formation (Matinheikki et al., 2017)	<ul> <li>No explicit information has come up in the interviews</li> </ul>
Maintaining a shared vision	Create inter-organizational coordinating bodies (Matinheikki et al., 2017)	<ul> <li>Not existing</li> <li>Could work, but the body should have an explicit goal</li> </ul>

Table 4. Comparison between theory and reality in the process of forming visions and articulating expectations.





(Dijk et al., 2018)	Create a common workplace to support consistent interaction (Matinheikki et al., 2017)	<ul> <li>COVID-19 interferes with common workplace</li> <li>Positive attitude towards common workplace</li> </ul>
	Prevent the vision from becoming rigid by scheduling specific meetings across actors to allow learnings from experimentation to feedback expectations (van der Laak et al., 2007)	<ul> <li>Realization that visions should be dynamic</li> <li>Project coordinator plays an important role by connecting actors</li> <li>The 5-year plan is very rigid and takes away flexibility</li> </ul>
Create solid and trustworthy expectations (Coenen et al.,	Formulate tangible expectations, which are not just promising ideas but backed by research and earlier experiments (Coenen et al., 2010)	<ul> <li>Expectations are based on earlier experiments</li> <li>Expectations should be formed as to what is feasible</li> </ul>
2010)	Formulate specific expectations, which are not just sketches, but enable falsification and definition of the next steps in the project (Borup et al., 2006)	<ul> <li>Expectations are not always clear and broadly formulated</li> <li>Discussing expectations is helpful</li> </ul>
Forming public expectations through public showcasing (Haugland & Skjølsvold, 2020)	Stage public trials to show the general public and policymakers what to expect from the project (Haugland & Skjølsvold, 2020)	<ul> <li>No contact with the general public</li> <li>PED should first be further developed</li> <li>Municipality is an important stakeholder in this</li> </ul>
	Organize public hearings to give the public the chance the participate in decision-making processes (Haugland & Skjølsvold, 2020)	<ul> <li>Intention is to include citizens in creating visions and expectations</li> <li>Citizens could perhaps be involved in the decision process</li> </ul>

### 4.3 Learning processes

### 4.3.1 General

During the interviews, many examples were given on how the PED-pilot in Buiksloterham has been a fruitful project to enable learning. Although not immediately fitting within the theoretical framework, examples of lessons learned, and methods to do so, can give more depth to certain claims that are made. The most frequently mentioned lesson is that in practice, plans always work out differently than intended. Interviewees claim that the learning process is an incremental step-by-step process with the main goal to identify and tackle barriers along the way. When these barriers are overcome and lessons are learned, the importance of transferring these lessons to other cities is emphasized. However, interviewees in coordinating roles do recognize that fellow cities might have specific characteristics, rendering these practical lessons useless for other cities. Therefore, they acknowledge the necessity of intentional learning about successful processes and transferring these. Examples are setting and achieving overarching ambitions, defining key learning moments within the project, learning how to make energy an attractive commercial good, or erecting new evaluation methods. While the importance of these learning processes is recognized by the interviewees, many states that these lessons are still in their infancy, requiring attention to become useful in the future.

To enable learning on these processes, interviewees identify different methods as useful contributions. Learning by interacting is seen as the most important method to derive lessons from the project. This could be interaction between different disciplines within the intervention of energy





communities, but also interaction between different cities and even different projects. Communication with different cities is currently seen as a major point to be improved, as the participants should be wary to reinvent the wheel. To improve on this, a massive open online course (MOOC) is being developed, for all project participants to share in the lessons learned. Other methods are to learn from previous sustainability projects across Europe to implement their lessons.

## 4.3.2 Developing a shared understanding, symbolic meaning, interpretative frame, and problem definition among project participants

When answering the question if project participants with a technical focus are less (or not) aware of the behavioral and social aspects of the project, one interviewee replied: "As far as I know, yes. But this is what I would like to discuss. There is no space within the project to ask these questions, which are there." (Interview 10). Another interviewee indicated that it is "really challenging to get into the same mental space" (Interview 8). Interviewees, therefore, agreed that there should be more room for an interdisciplinary approach "To understand why there are some frictions potentially between partners within the group that come from these different backgrounds." (Interview 8), in which project participants are allowed to experiment with the added value of bringing multiple points of view together.

Interviewees indicate that these different viewpoints can be conflicting and are sometimes caused by fundamentally different definitions of concepts and world views of project participants. For example, "*the idea … is to create a local energy market but it is not clearly defined what it is*" (Interview 1). The lack of shared definitions causes people to interpret the concepts in the ATELIER project from their point of view. The main friction that arises from this process is the gap between a technological and social viewpoint. The technological viewpoint approaches the challenges in ATELIER from a top-down "we are going to think about the project, and it will be rolled out, [the citizens] just have to deal with it" (Interview 6) and practical perspective "I am more … practical in terms of actually wanting to deliver something and actually see it built in stone. (Interview 8). The social viewpoint approaches the challenges from a bottom-up "not trying to come from the outside with a completely new vision but seeing where there's linkages within the community" (Interview 11) and theoretical perspective "We want to look at energy communities, not just as those groups that have one connection point to the grid … but as groups that might emerge through a shared interest, or a common point of view." (Interview 10).

For the two disciplines to understand each other's terminologies and get to a shared understanding, it is important to have an open and safe space to discuss. Interviewees indicate that "*meetings are pretty open*" (Interview 6) and "*it's quite an open space for people to talk about ideas or plans*" (Interview 8). However, there is also room for improvement because of the structure of the work packages mentioned before. Even though the project plan states that open dialogue should be promoted within the meetings, meetings are often formal with a high information density (Interview 6,8,11).

### 4.3.3 Enable self-reflection for project participants to engage in second-order learning

According to the project plan, the reflexive monitoring framework is ought to be used in monitoring and evaluating the project, and extract lessons from them. However, implementation of this learning framework is less ideal than initially thought. The interviewees state that the RM framework has been used in the beginning: "We started out with the reflexive monitoring framework, which is very, very open." (Interview 12). However, the interviewee states that the open character of the framework renders usage of the framework as very inconvenient: "If everything is so open, everything is interesting. But everything is a lot." (Interview 12). This has led to the development of other learning frameworks, such as the theory of change, which is used to "define middle term, short term, outcomes, the impacts and the different activities, to put everything in tangible results." (Interview 12), but which





is still in its futile stage. Another learning framework distinguishes different levels within the project on which can be learned (Interview 12). Other actors tend to be unaware of these changes, since some of the interviewees are still of opinion that the RM framework should be used more: *"We have a lot of ideas already, for example reflexive monitoring, which I think could be implemented"* (Interview 6). Next to these two frameworks, interviewees also state that KPIs in itself *"help to frame some thinking on the objectives of the energy community."* (Interview 3). Despite the possibilities for applying different frameworks, interviewees still think that it is hard to grasp what is learned. Lessons are *"not registered"* (Interview 12) and *"not really structured"* (Interview 6). On top of that, learning frameworks are only selectively applied and can be implemented in a more structured way. (Interview 6 & 8).

Despite the lack of a structured way of learning, interviewees have learned on a personal level. Interviewees indicate that personal learnings should be aggregated to a higher level, both successes and failures need to be included in lessons and key learning moments should be defined. (Interview 6,10,12). Interviewees have also done reflection on the nature of ATELIER itself and the solutions it brings for society. These reflections included that the PED concept is "*already out of date"* (Interview 5), other issues are questioning the goal of the PED concept (Interview 8).

## 4.3.4 Focus on project processes that need to be embedded in existing organizational structures

Interviewees mention that learning "is happening everywhere, but it is not always recognized, shared or noted down" (Interview 6), and it is also based on personal contacts with whom lessons are shared instead of a structured process being in place (Interview 10). This makes it hard to deviate from the existing learning processes which interviewees indicate it not done (Interview 8 & 11).

## 4.3.5 Constant monitoring and evaluation of the project, feeding back into project structures, ambitions, and plans

As many interviewees have touched upon, the ATELIER project is evaluated by monitoring a set of KPIs. The KPIs are designed with the project developers and used to make a cost-benefit analysis of the PED (Interview 3 & 9). Challenges include adhering to the monitoring standards of the EU which are mostly environment and emission-based (Interview 3) and making non-technical KPIs measurable (Interviews 3,8,10).

The project's rigidity starts at EU level according to the interviewees: "*especially with those EU projects, there are big grant agreements, there's 500 pages, and it takes a little bit away of the innovation capacity*" (Interview 9). Also, the monitoring and evaluation only have taken place in the last 2 years of the project (Interview 3).

Table 5 summarizes the findings above and explicitly links them back to the activities described in the theoretical framework.





Subprocess	Theoretical activities	Reality
Developing a shared understanding symbolic meaning, interpretative frame and problem definition among project participants (Brown &	Provision of a neutral and safe space in which participants can openly express their views and learn about each other's views (Culwick et al., 2019) Ensure that participants understand each other's terminologies (Culwick et al., 2019)	<ul> <li>Meetings are open</li> <li>An open space is provided to ask question</li> <li>However, meetings are very dense and formal with a lot of complex information</li> <li>Challenging to understand others from different disciplines</li> <li>No opportunities to ask questions to colleagues from different disciplines</li> <li>Should be more room for an interdisciplinary approach</li> </ul>
Vergragt, 2008)	Ensure that network actors have congruent worldviews and initial interpretative frames (Brown & Vergragt, 2008)	<ul> <li>Differing definitions of what the energy community will be</li> <li>Gap between social (bottom-up) and technological (top-down) viewpoints</li> <li>Citizens are to be educated on the topic of energy communities</li> </ul>
Enable self- reflection for project participants to engage in second-order	Engagement in self-reflection by project promoters themselves to ensure a level of learning high enough to enable others to learn (Bögel et al., 2019)	<ul> <li>Reflection and learning takes place on a personal level</li> <li>Should be aggregated to a higher level</li> </ul>
learning (Scholl et al., 2018)	Apply learning frameworks that foster second-order learning processes in experiential processes, such as the Reflective Learning Framework (RLF) (Whalen & Paez, 2021)	<ul> <li>Initial framework was proposed but has been discarded</li> <li>Other learning frameworks are being developed</li> <li>Learning frameworks are selectively implemented</li> <li>Learnings are not registered and not structured</li> </ul>
	Not connected to any activity	<ul> <li>Learning from and interacting with other projects should be improved on</li> </ul>
Focus on project processes that need to be embedded in	Formalize collections of individual experiences into higher-level processes (Evans et al., 2021)	<ul> <li>Learning is not always recognized and shared</li> <li>Learnings are shared based on personal contacts and are not structured</li> </ul>
existing organizational structures (Evans et al., 2021)	Experimental, intentional deviation from existing processes and project management approaches and re-embed successful experiments into existing processes and management practices (Bresnen et al., 2004)	Little deviation from existing     processes
Constant monitoring and evaluation of the project, feeding back	Evaluation of KPIs themselves instead of mere evaluation of outcomes based on KPIs (Patel et al., 2017)	<ul> <li>Hard to follow monitoring standards of EU</li> <li>Hard to make non-technical KPIs measurable</li> </ul>

Table 5. Comparison between theory and reality in the process of learning





into project structures, ambitions, and plans (Patel et al., 2017) Constant iteration of the decisionmaking → monitoring → assessment → new decision process on micro and higher levels (Williams & Brown, 2014)

- Project is very rigid due to EUbounded structure
- Monitoring and evaluation of the whole PED only takes place in last 2 years





## 5. Synthesis and Recommendations

In this section, the results are converted into specific recommendations for the ATELIER project to enhance the effective upscaling of the PED concept. To this end, the results outlined in <u>section 4</u> were analyzed through connecting statements from different interviews and different documents that emerged in the context of discussing different processes of upscaling. This process led to the identification of six *critical factors* that are deemed to be crucial in the execution of a PED project, as they determine to which extent the core processes and their related sub-processes and activities will be adequately functional. These critical factors are grouped within the theoretical core processes and integrated into the figure of the dynamic interaction within and between the key processes of upscaling, listed again below (Figure 10).

In the following subsection, the critical factors and the recommendations that go along with them will be outlined. Table 6 provides a summary of these recommendations.



Figure 10. The dynamic interaction within and between the key processes of upscaling.

### 5.1 Articulation of visions and expectations

### 5.1.1 Common goals and shared understanding

ATELIER is a large project with diverse actors with different backgrounds. Throughout the interviews, it became apparent that interviewees provide different definitions of the vision within ATELIER and





the core concepts of the intervention. It should be noted that while interviewees were in general aware of differences between definitions provided by different people, they did not know the interpretative frame through which others view energy communities. However, they did express interest to learn more about others' interpretative frames.

Consequently, the differences in understanding of central concepts along with the interest to learn from each other should be used to align the different definitions and goals to produce terminologies, interpretative frames, and targets that are shared by all actors. This can lead to a common understanding and an alignment of goals that all actors are in favor of. As one interviewee indicated, this could be achieved by allowing an open exchange on these topics and through kicking off projects with workshops in a bigger group explicitly aimed at such an alignment. A common method for this alignment is a visioning exercise (Global Development Research Center, n.d.). A visioning exercise is based on creating a shared vision, building a strategy to achieve the vision, and continuous communication of the shared vision (Thoms, 1997). An agenda for such an exercise is included in <u>Appendix 4.B</u>. It should be noted that the municipality has an important role in vision formation, as it needs to be ensured that the vision fits the overall vision of sustainability within the city and is aligned to other projects (co-)developed by the municipality (Eneqvist & Karvonen, 2021; Kronsell & Mukhtar-Landgren, 2018).

In Buiksloterham, such a visioning exercise should thus be executed soon. While it is unfeasible to conduct such an exercise with everybody who is involved in the pilot due to a large number of project participants, the exercise could be held at the intervention level. The results from each intervention could then be synthesized to the pilot level, involving feedback loops with the intervention to ensure accurate representation of all intervention-level visions. Furthermore, the vision should be re-evaluated regularly (annually or semi-annually), to be able to account for new developments in the project and to prevent rigidity.

### 5.2 Actor network formation

### 5.2.1 Initial network assembly

In projects such as ATELIER, the informal process of actor assembly mandates that project initiators have a broad network of potential project participants and that they are able and willing to activate this network to participate in the project. In this orientation phase, smaller and non-traditional actors should be considered for their unique outsider view. In the process of network assembly, initial actors should identify possible participants based on their local knowledge, experience with similar projects, personal connections and trust, and their alignment with the project goals. Moreover, it

## MAKING-CITY

Besides interviews within the ATELIER project, an interview was conducted with a project promoter from MAKING-CITY. MAKING-CITY is a project that has a resemblance to the ATELIER project: two Lighthouse cities try to create a PED and retrieve lessons to be shared with Follower cities.

The interview was conducted after the critical factors were derived and sought to retrieve insights on how another similar project handled these challenges.

On a project level, MAKING-CITY provided two interesting insights. They have deliberately separated the technological and social parts of the project. They accept that they do not know exactly what the other side is doing and focus on learning as much as possible in their own research. Furthermore, they have a less elaborate project plan than ATELIER. This allows for more flexibility in the project structure but also causes less clarity in what every project partner is working on.

In terms of citizen engagement, MAKING-CITY recommends to first build a community of citizens and then start about the way in which they consume energy, instead of the other way around. They have also experienced that citizens want to gain something from participating in the research project instead of only being a test subject.







is important to distribute roles within the project equally among actors already at the beginning of the project, to prevent high-power actor formation. Explicitly discussing and documenting the purpose of each actor's involvement in the project and the connected responsibilities of the actor ensures insights into the division of the project in an early stage.

In Buiksloterham the initial network formation can be considered complete. Hence, no specific recommendations need to be provided for this critical factor.

### 5.2.2 Role of citizens within the project

Multiple interviewees stated that energy communities revolve around citizens. The vision of project participants is that they want to engage and understand citizens, as they are the pioneers of the community. However, the implementation of this vision is hampered by the fact that the buildings are still under construction, so no citizens have moved in yet. Consequently, in the current process, ex-post engagement is the means to create an energy community in Buiksloterham. Future residents are unaware of the goal to create an energy community and what will change in their daily life when buying apartments. A potential reason for this is the lack of public communication about the project. Therefore, the public, including potential residents, does not know what to expect from the PED pilot. This could lead to resistance from residents who are unwilling to change their way of living.

To realize the active role of citizens in the development of the PED, it is necessary to start with engaging citizens before the move-in date. A sensible approach is to first start forming a community and only later add the context of energy, as this enables one to already work with a functioning community once potentially difficult topics need to be addressed (MAKING-CITY, 2021). To this end, active engagement with future tenants is necessary. Similarly, there should also be communicated with the public to raise awareness of the PED and thereby attract suitable tenants. Furthermore, citizen engagement and citizen involvement need to follow a clear long-term strategy. Here, it is recommendable to apply concrete frameworks that can provide structure to activities involving citizens. An example of an apt framework is the "Hybrid-Agile Methodology" (HAM), in which the needs of citizens can be fed into the project plan iteratively, thus enabling constant feedback and input by citizens (Vácha et al., 2016). Another way to ensure a stake of citizens in the PED is through financial participation, giving citizens the possibility to become co-owners of the energy community (Alpagut & Gabaldón, n.d.).

In Buiksloterham, some of the flats in the new buildings of Republica have already been sold. Hence, it should be possible to identify some citizens already, providing a starting point for the formation of a community. A form of regular exchange with these citizens should take place, for example in the form of information evenings. Next to this, elements of the hybrid analysis and modeling framework could be implemented: the information evenings could be used to collect inputs from citizens on what they require from the PED system, and reporting on progress based on the inputs of the previous meeting could be given. In addition to engagement with (future) citizens, communication with the public should not be neglected. Here, a website or a blog dedicated specifically to this target group could be set up, potentially in collaboration with the real estate developers.

### 5.3 Learning processes

### 5.3.1 First order learning: Active information spread and retention

Multiple interviewees indicated that the spread and retention of information is a crucial element in ATELIER. It was noted that information and knowledge are frequently embedded in people involved in the project instead of within organizations. This can present an issue in the case of people leaving or joining the project, as knowledge might be lost with project members leaving. Similarly, the





embeddedness of knowledge, as well as the sheer amount of information available, makes it very difficult for project members joining to gain an overview. This huge amount of information spread across many different actors and channels makes knowledge brokering a highly crucial activity within ATELIER. Additionally, brokering is not just relevant across organizations, but also within organizations to ensure that all relevant individuals and departments are aware of the project.

Consequently, accessibility of information is critical to permit all project participants to access all needed information. This implies that knowledge needs to be encoded in a manner that makes it easy to find and simple to process, either through adequate documentation or through efficient communication with knowledge brokers. However, even once these steps are taken, it is necessary to assure sufficient room for questions and discussions in meetings and workshops to allow participants to catch up in case of lacking knowledge. Moreover, knowledge is frequently tacitly embedded in individuals. As a certain turnover of project participants can be expected in a five-year project due to individuals retiring or changing their employer, off-boarding plans including documentation of tacit knowledge are necessary to prevent that information is lost.

In Buiksloterham, knowledge is in principle widely available due to extensive reporting. Nonetheless, the length and density of these reports render the information contained in them rather inaccessible. Hence, the creation of one-pagers to summarize the most important pieces of information contained in these reports can contribute to making information more readily available. Concurrently, informing meeting participants beforehand which knowledge is needed to be able to follow allows attendees to inform themselves on these topics if needed. Furthermore, it should be very clear who project participants need to contact to obtain information from a certain organization or on a certain topic. This requires the explicit nomination of knowledge brokers.

### 5.3.2 Second-order learning: Learning by interacting

Many interviewees stated that they learn best by interacting informally with other people working on the project, rather than through formal meetings or reading reports. This holds particularly true for learning on a higher level. Furthermore, several interviewees explicitly stressed the wish to collaborate more with each other but acknowledged that such collaboration must have a purpose to produce results.

Hence, the creation of spaces explicitly aimed at enabling interaction between individuals – formally and informally – is expected to foster learning by interacting. This includes, but is not limited to, face-to-face interaction of individuals belonging to different organizations and reserving agenda points for active discussion in meetings.

In Buiksloterham, the fact that almost all organizations are based in Amsterdam makes the setup of a common workplace feasible. Here, face-to-face contact can be fostered by enabling project participants of different organizations to work together physically at least occasionally. This idea could be extended to inter-city collaboration through organizing a common physical workweek semiannually or annually, as one interviewee suggested. Another possibility to increase interaction is socalled "solution fairs", in which different work packages or interventions can meet and work on finding solutions on their respective issues in mixed smaller groups. Such a fair can also be organized between cities. A suggestion for an agenda for such a fair can be found in <u>Appendix 4.A</u>.

### 5.3.3 Learning consolidation: Structured learning

In most interviews, the presence of second-order learnings on an individual level could be identified. However, aggregation or collectivization of these individual learnings to work package or





intervention level seems to barely happen. Therefore, it is apparent that in a project like ATELIER, aggregation of individual-level learnings to project-level does not happen automatically but needs to be actively managed.

Thus, a framework through which the collectivization of second-order learning can be steered in a structured manner should be implemented, with individual second-order learnings as a starting point. Ideally, such a framework should be able to facilitate collaborative learning and thereby maximize the number of second-order learnings produced (Whalen & Paez, 2021). Important elements that should be addressed by the framework are the re-evaluation of processes and KPIs (Patel et al., 2017), including active experimentation with different processes (Evans et al., 2021). Learning about these processes and KPIs should be re-embedded into existing project structures (Bresnen et al., 2004). To facilitate aggregation from individual to collective level, a dashboard could be implemented on which every project participant documents which task they are working on and which learnings they derive from the execution of those tasks (O'Toole, 2011).

### 5.4 Overview of recommendations

The critical factors are summarized within one comprehensive table (Table 6). The six critical factors are listed with the subsequent reasons why these factors are critical and not yet fully fulfilled.

Critical factor	General recommendations	Specific recommendations
Common goals and shared understanding	Kick-off projects with visioning exercises explicitly aimed at the alignment of goals and terminologies. Ensure that the project vision is aligned to the municipality's overall vision on sustainability and urban interventions.	Conduct a visioning exercise on the intervention level, synthesize results to pilot level. Regularly re-evaluate vision (annually or semi-annually).
Initial network assembly	Initial actors should have large existing networks. Use trust as a selection criterium for project partners.	No recommendations, critical factor is in the past.
Role of the citizens within the project	Enhance public communication. Involve new homeowners before they move in, for instance by hosting information evenings. Use a concrete methodology to involve citizens, e.g. Hybrid- Agile Methodology (Vácha et al., 2016).	Set up communication channels with citizens (website, blog). Identify citizens that will move into flats, start community building. Allow input from citizens as to what they require from the PED system, progress report iteratively.

Table 6. Summary of critical factors and recommendations





Active information spread and retention	Create accessible documents. Leave room in meetings for	One-pagers to summarize long reports.
	questions and discussions. Knowledge brokering.	Communicate what needs to be known before a meeting.
		Make clear who knowledge can be obtained from, if necessary.
Learning by interacting	Create spaces explicitly aimed at interaction between individuals	Organize a solution fair between interventions, work packages or cities. Create a common workplace.
Structured learning	<ul> <li>Set up framework to condense individual 2<sup>nd</sup> order learning into collective learnings, including: <ul> <li>Re-evaluation of processes and KPIs</li> <li>Active experimentation with different processes</li> <li>Documentation of individual tasks and learnings derived from them</li> </ul> </li> </ul>	

### 5.5 Interplay between core processes

### *5.5.1 Flexible project structure*

Along with the individual core processes, the interplay between these is equally important. The interplay between the processes ensures a flexible innovation project that continuously realigns. Multiple interviewees stated that the rigidity of EU project structures and that many goals and KPIs already need to be determined for the project grant, reducing innovative capabilities and dynamics. The rigidity of the project also renders experimentation and deviation from existing practices and project management approach very difficult, discarding the possibility to learn from new experiences. This is amplified by the fact that once determined, KPIs are difficult to adapt. Furthermore, there is no formal assessment of when certain actors are or are not needed in the project. This can result in a consortium that is too large to handle, with partners performing tasks that are not relevant for the project anymore. At last, interviewees expressed the concern that too much time is spent on producing reports rather than on executing activities contributing to the growth of the PED.

While many interviewees indicated that it is not possible within the frame of ATELIER to abandon the rigid project plan, there is room to reiterate the processes underlying the deliverables of the project plan. This is an area in which more flexible and experimental approaches are possible, enabling the possibility to learn from unconventional practices. For example, the direction of future project development within the frame determined by the project agreement could be based on unanswered and important research questions to enhance learning effects within the project. To implement this, regular review meetings need to take place to ensure fast-paced evaluation and implementation of new insights. Potentially, the Innovation Ateliers could be adapted to serve this role. To complement this structure, a formalized evaluation of when actors join or leave the consortium could prove to downsize the network and enable actors to get a better overview. This could for instance be achieved by yearly evaluations and plans, determining which actor is needed at which moment. The possibility for flexible contracting should be considered in these plans (Interview 6).





### 5.6 Relation to upscaling

As visualized in Figure 11, the critical factors identified in the context of Buiksloterham are also important in the context of fellow cities as it is process knowledge about these factors that need to be upscaled to fellow cities. However, these lessons do not have to be integrated into existing processes but can be considered from the very start of the PED. Some of the factors are more important in the initiation phase of a PED, while others are more applicable during the execution or even evaluation of the project.



Figure 11. The process of learning in horizontal upscaling of PEDs.

As visualized in Figure 11, the critical factors identified in the context of Buiksloterham are also important in the context of fellow cities as it is process knowledge about these factors that need to be upscaled to fellow cities. However, these lessons do not have to be integrated into existing processes but can be considered from the very start of the PED. Some of the factors are more important in the initiation phase of a PED, while others are more applicable during the execution or even evaluation of the project.

During the initiation of a new PED, the first critical factor that needs to be considered is the active spread and retention of information, since this helps in setting up the project efficiently. Lighthouse cities can show what to put in documents and how to stimulate active participation in meetings. At the same time, the project promotors of the new PED should start assembling the core stakeholders of the PED. Lighthouse cities can share experiences about which type of actors to include, but project promotors should prioritize local context, personal connections, and trust. When the stakeholders have been assembled it is pivotal to set up common goals and develop a shared understanding of what the PED project exactly entails. In this process, it is especially important to focus on the alignment of commercial and non-commercial actors. Lighthouse cities can play a role in the





organization of interactive workshops discussing visions and expectations. Similarly, a structured learning framework must be set up, with which lighthouse cities can help as well. In the entire initiation phase, the role of the citizens must be a central point of discussion. Project promoters of the new PED must determine ways to communicate with the public and think of ways to involve future homeowners of homes within PEDs. Lighthouse cities can help by promoting the new PED among their network and media channels.

During project execution stakeholders start interacting with each other on many different aspects, therefore learning by interacting becomes an important factor as well. This should be already incorporated in the structured learning framework and combined with the active spread and retention of information and the aggregation of individual second-order learning should lead to an organized way of learning and documenting the lessons. During the execution, new actors may join the network because they bring specific expertise into the project, and others may leave the network because their part is done. In the meantime, goals, visions, and expectations should be discussed periodically and adjusted if necessary. The same holds for the opinions and ideas of citizens involved in the project.

When the project is evaluated, the most important factors are the ones concerned with learning. The documented lessons and second-order learning outcomes should be discussed and critically reflected upon, preparing to pass it on to the next installment of a PED. All the critical factors over time are displayed in Figure 12.



Figure 12. The critical factors in a 'PED cycle'.

### 5.7 Transferring lessons to other cities

To be able to continuously apply the lessons learned within the Buiksloterham PED pilot in the fellow cities, lessons should be transferred as successfully as possible. Moreover, lessons should be shared that carry the most value for other cities and can be put to good use. To ensure the latter, cities should predominantly share lessons about how to implement and execute key processes within a project (Interview 2). More specific and detailed problems within the project could be very context-based, and thus not valuable to the other cities. In transferring lessons about these processes, it is not only important to share lessons about the best way to execute them. As interviewee 10 states, lessons





should also be shared on what failed during the execution of the processes and what kind of pitfalls they have encountered, to prevent the same mistakes from happening in other cities. Moreover, lessons learned should be about how to approach encountered problems instead of just the solution itself.

To ensure successful transfer between cities, both the interviewees and the literature emphasize the importance of transmitting information between cities actively, preferably in person (Yakhlef, 2007). As elaborated on before, learning via interacting stimulates second-order learning, which can prove valuable in transferring lessons to the local context of other cities. To allow lessons shared in person, a couple of days in the beginning of the end of the summer could be reserved wherein all the actors of different cities meet up with each other. During these meetings, actors can be updated on each other's respective progress, and lessons can be shared from the previous year. During the project itself, one interviewee states that personnel should be switched between cities, to use and transfer knowledge and skills very embedded in individuals themselves. For example, individuals from the city of Amsterdam could be switched to other cities, to help in the coordination of the fellow cities (Interview 2). This is supported by literature, which states that knowledge can effectively be transferred between projects by creating knowledge enablers: knowledge brokers who circulate frequently among the projects and bring knowledge with them in embodied forms. An important task of these knowledge brokers is to translate and frame information in the context of the target project (Yakhlef, 2007). Additionally, personnel switch can also be organized in the reverse direction: personnel of fellow cities can be switched to Amsterdam to learn first-hand about what is happening there to bring it back to their home town.

Next to learning through interacting, learning through documents remains an important aspect for fellow cities. Here, similar recommendations as within ATELIER hold: documents need to be accessible, so one-pagers are recommendable. Similarly, it should be communicated before meetings which knowledge is expected from meeting participants by fellow cities.





## 6. Conclusion

This research strived to answer the question: "Which processes need to be learned and which activities need to be undertaken by the actors within the Buiksloterham PED pilot to enhance effective upscaling of PEDs?". To this end, literature on the Multi-Level Perspective, Strategic Niche Management, urban experimentation and upscaling as well as connected concepts from other literature strands were reviewed, resulting in a theoretical framework displaying generic processes, sub-processes, and activities that are crucial in upscaling general urban experiments (Table 1).

The goal of the empirical research, consisting of stakeholder interviews and document analysis, was to identify the presence and quality of the theoretically derived processes and activities within the PED pilot Buiksloterham. Hereafter, these activities were tested on their relevance in the context of a PED, and additional key activities and processes were identified. As suggested by existing literature and as mentioned by several interviewees, learning of processes rather than of concrete outcomes, KPIs or actions is imperative when engaging in the upscaling of PEDs. The reason for this is that while differing local contexts require different concrete interventions in different places, the processes that are necessary to run such a project do not differ across contexts and can thus be transferred to other cities.

Taking this into account, six "critical factors" were identified as the crucial processes in the context of PED development based on the empirical results: *Common goals and shared understanding, Initial network assembly, Role of citizens, Active information spread and retention, Learning by interaction and Structured learning.* For each of the critical factors, general actionable recommendations and/or ideas for project promotors are provided. Since the processes are interconnected and influence each other, a *flexible project structure* is needed throughout the project. Additionally, more specific and context-bound recommendations have been provided to the stakeholders concerning the critical factors applicable to the PED pilot in Buiksloterham. Both the factors and the recommendations are related to and derived from the generic activities and processes in Table 1.

To horizontally scale up the Buiksloterham PED pilot towards the fellow cities, lessons learned about the critical factors and additional fruitful topics need to be transferred to fellow cities. The critical factors are therefore applied to future PEDs in fellow cities, introducing the critical factors during project initiation, execution, or evaluation. Lighthouse cities play an important role in the initiation phase by helping in setting up the PED using their experience. Managing these processes directly links back to the goals of SNM to further develop the PED concept towards growth and stability, to the extent that market forces can be introduced to the PED niche. Therefore, further development, reiteration, and upscaling of the PED niche using the critical factors will contribute to the window of opportunity needed to challenge the current regime. Ultimately, the PED concept will then lead to a new configuration of a citizen-driven and sustainable energy regime.





## 7. Discussion

### 7.1 Implications

### 7.1.1 Relevance for client

The contribution for the AUAS is first and foremost the information provided on the presence and absence of the theoretically derived processes and activities in energy communities and the PED pilot in Buiksloterham itself, and the recommendations based on this analysis. As the AUAS asked not only for solutions they can directly implement in Buiksloterham but also for solutions that can be implemented in the broader ATELIER project, this report offers general recommendations that can be distributed through the AUAS channels. Regardless of the recommendations, the fact that this research is executed has motivated stakeholders to critically reassess the project. Combining this with the thought-provoking questions in the interviews, giving the stakeholders a means to gather their thoughts on the quality of abstract processes, proves that the research has a strong implicit value. Furthermore, the case study on energy communities provides the AUAS with more specific information on how to manage this upcoming intervention.

Next to the recommendations that AUAS can use in the further progress of the project, contributions in the theoretical and methodological sense are made. The contribution in the theoretical sense is done by providing a framework that places the PED in the light of upscaling. During conversations with coordinating bodies in the Buiksloterham pilot, it became apparent that the actors were already partly familiar with Multi-Level Perspective. Building forward on their prior knowledge with Strategic Niche Management, urban experimentation, and upscaling literature, this study has provided them with a set of processes and activities relevant for the project that need to be fulfilled or performed, giving the stakeholders the handles for guiding the project. The methodological contribution consists of the translation of this framework to an interview guide, that can be used by monitoring bodies to measure the stakeholders' views throughout the project.

### 7.1.2 Relevance for science

This research contributes also to scientific debates. The three processes of SNM and upscaling (actor network formation, visions & expectations, and learning processes) and their importance are already thoroughly described in the literature. However, no method of operationalizing and measuring the three core processes and methods for improving the processes has been proposed so far. The framework provided in this research includes processes and activities that are derived from literature. With the help of such a framework, niche technologies and systems can be analyzed.

Next to extending the SNM framework with practical activities, the framework is specified in the context of a PED. This research thus contributes to the literature on PEDs by giving insights into the (desired) processes and challenges of a PED system.

### 7.2 Research quality indicators

To substantiate the research methods used, the research quality indicators are elaborated upon.

### 7.2.1 Reliability

To assure consistent research methods, the data collection and data analysis have been performed by multiple researchers at once. Furthermore, all the researchers have roughly had an even share in the collection and analyses of the data, to prevent tunnel vision from developing. The process in which the researchers collected and analyzed the data has been critically cross-checked by the other researchers.

To assure that the conditions of the interviews were equal, the interviewees have been provided with the same information and definitions of used concepts before the interviews. Furthermore, all the





interviews have been held through Microsoft Teams and roughly had the same duration of 1 to 1.5 hours. The interviews have always been conducted in pairs of two, in which one interviewer adopted a leading role, and the other interviewer took track of time and asked more specific questions. To assure consistency across the interviews, interview pairs have been switched constantly. Apart from the first interview, it was assured that one of the interviewers always had already conducted an interview.

Theoretical saturation has been attained during the last 2 or 3 interviews. During these interviews, very few new insights were gathered, and most of the content during the conversations consisted of affirmations of earlier statements. However, new ideas for improving the processes were yielded up until the last interview.

### 7.2.2 Validity

To ensure the validity of the research, research methods appropriate for researching the phenomena derived from the literature have been adopted, in combination with a fitting sampling method. To ensure that the concepts described in the theory could be measured, the performed desk research and interviews have been guided by and based on earlier research. Consequently, the collected data has abductively been connected to the pre-existing theoretical framework during the data analysis. The interviewees have been sampled in concordance with the ideas of the AUAS, leading to a valid collection of interviewed stakeholders in the eyes of the client. However, this way of sampling could also partly be biased, since the AUAS could be too involved in the project and could thus fail to see the project holistically.

### 7.2.3 Generalizability

The generalizability of the presented results is discussed on two levels: towards the broader PED pilot within Buiksloterham and towards the other fellow cities.

The generalizability towards the PED pilot is mainly determined by two factors: the representability of the case to the PED pilot, and the inclusion of interviewed people in the energy community and the broader PED pilot. By interviewing actors who were more included in the PED pilot than in the case, insights have directly been gathered on the level of the PED pilot. Moreover, some of the actors were involved in both the case and the PED pilot. These specific actors were able to connect the derived insights about the case with the PED pilot, by elaborating on the applicability of earlier established insights towards the PED pilot, thus increasing the generalizability. Furthermore, the case is thought to represent the multifaceted nature of the PED pilot, since both projects consist of various disciplines, e.g. social, technical, and coordinating.

Important to note is that the generalizability towards the fellow cities however is partly impaired due to the different geographical contexts in which the cities are located. The specific and context bounded information and recommendations about what kind of activities the AUAs could undertake to enhance the development of the PED pilot in Buiksloterham could not be applicable in differing legal or social contexts. However, the general recommendations on how to improve the higher-level processes and sub-processes are still very generalizable to other contexts, irrespective of their legal and social context.

### 7.2.4 Replicability

Comparable research contexts are prevalent in the fellow cities and other EU funded PED projects across Europe, granting the possibility to conduct the study again in a later stage in time. Moreover, the applied research methods are preserved and can thus be applied at a later point in time as well. Thus, the conducted study is believed to be highly replicable.





### 7.3 Limitations

The research is subject to some limitations, which are all connected to the data collection. First, not all the preferred interviewees have been included in the research. This exclusion is due to both the limited time frame in which the research had to take place and the limited availability of the preferred interviewees. Data has been collected within a time frame of three weeks, in which not all respondents were able to make time. Moreover, some of the preferred interviewees were not available at all, due to various personal reasons. Stretching the research duration could provide interviewees with more possibilities to participate in an interview, however, this was not possible due to a fixed end-date of the conducted research. The lack of availability due to personal reasons of the interviewees could not be mitigated in any way as well. Second, collecting data on all the theoretically proposed processes and activities was not feasible, due to the extensive amount of activities and the detailed nature of the activities. To let the interviewees express themselves elaborately, a level of abstraction had to be maintained by asking open questions in the semi-structured interviews. This has led to the fact that the manner of execution of some of the activities has not been covered during the interviews. To accommodate for these absences, specific recommendations applicable to Buiksloterham have been provided nevertheless. The third limitation is related to the execution of the case study. The choice to undertake a case study instead of researching the broader PED project in Buiksloterham has led to a somewhat unclear definition of research boundaries. This unclear definition is both seen in the execution of the desk research and the conducted interviews. For example, when conducting the interviews, the involvement of the interviewees within the case study varied considerably. Various actors were highly involved in the case and thus were able to provide comprehensive and detailed information about the case itself. However, some of the interviewed actors were less involved in the case. On these occasions, insights were often provided by the interviewee on the more general PED project in Buiksloterham, of which they had more extensive knowledge. This resulted in a sub-optimal dataset for conducting the case study, in which observations have not solely been provided on the case, but on the broader project of ATELIER as well. Nonetheless, the interviewees oftentimes stated that they believed that the insights on the broader PED project are, to a certain extent, comparable to the studied case. Thus, insights from the interviews are based on both the case and on the broader PED project although all the insights are deemed applicable to the studied case.





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## Appendix 1: Operationalization table

### Table A. Operationalization table of the theoretical activities

	Activities	Operationalization	Specific interview questions
Actor network formation	Build close personal and professional connection with actors of different backgrounds (Koster & van Leynseele, 2018) Transmit information between actors and translate information to language of actor (Caniëls & Romijn, 2007)	Connection between different actors Connection between individuals belonging to different organizations Existence of an actor responsible to transmit information to between actors Effectiveness of this actor (share of information received by	How would you describe your relationship to colleagues from other organizations? How is it to work together with them? Did you or anybody else invest time in building a relationship with these colleagues? If yes, which effect did that have? If no, do you think it would have helped your relationship? Do you see any ways how your relationship with those colleagues could be improved? Do you feel that there is anybody who is responsible for transmitting information between different organizations? Or are you maybe this person? If there is such a person, do you feel that this person enhances your understanding of what the other organizations are doing? If yes, which specific activities of that person give you this feeling? What could that person still improve?
	Creation of a dedicated network builder with the task of bringing actors	Existence of a network builder	Who in this project, in your opinion, is very active in bringing people across different organizations together? Was this person concretely assigned this role? Do you think that the
	together and organizing meetings (van der Laak et al., 2007)	Activities of the network builder	existence of this person brings the project forward? Why? What could this person still improve?
	Include non-traditional and smaller actors to increase effectiveness and innovativeness (Dignum et al., 2020; van der Laak et al., 2007)	Involvement of non- traditional actors Impact of non- traditional actors Network position of individuals in their own	Was there any organizations of which you were surprised to see that they are involved in the project? Why? How would you describe the role of this organization? Do you feel that their presence in the project has a positive impact? Why? How would you describe your position within your own organization? How does this impact your work in the Buiksloterham project? Do you feel that your colleagues in
	Ensure that individuals are not isolated within their own organizations but have a network on their own to capitalize on (van der Laak et al., 2007)	organization	other organizations have similar positions within their respective organizations? How does that impact the project?
	Constant assessment of	Actors joining the	If you look at all organizations that are involved in the
	who should leave or join the network (Caniëls & Romijn, 2006) Monitor potential barriers of cooperation between actors (Caniëls & Romin	project Actors leaving the project Evaluation of actors in the network	project, do you think that any organizations are missing? Why? Any organizations that in the project that are not actually needed? Why? Was this ever formally evaluated during the project? Do you think that helped/would have helped?
	2006)		an organizational perspective (rather than with individual colleagues)? Are there any organizations with whom it is difficult to collaborate? If yes, why and what do you think could be done to improve this? Is there anybody who is responsible for taking care of such issues?
Forming visions and expectations	Co-designing the vision instead of passing it down (Matinheikki et al., 2017)	Collective and active efforts in the design of the vision	What is your vision on the project? How would you describe the way you established this vision? How would you describe the way the other parties included in the project have established a vision of the project? Have there
	Creating a shared culture and setting up shared goals between the parties (Matinheikki et al., 2017) Distributing roles equally	Existence of shared sub- goals among actors A shared way of reaching these goals in which everybody has a	been any moments in which the vision and goals of the project have been discussed? -> How did that take place? To what extent do you think it is important to have a shared vision among actors? -> How do you think this can be realized? -> How could a common vision be co-established, together with other parties?
	to inhibit high-power actor formation (Matinheikki et al., 2017)	part	How is the process of setting up major goals and sub-goals within the project? How do the parties make sure that these





		Equal division of tasks and roles in reaching	goals are reached? How is the cooperation between actors towards these goals?
		goals Equal (decision-making) power between parties	Could you describe the process in which tasks and roles are divided in reaching these goals? To what extent are the tasks divided equally among all the parties? Why? How do you ensure an equal division of tasks? How are decisions made when the parties are confronted with difficult choices affecting all the parties within the project? Does everybody have a saying, or is it decided by a few? Why?
	Create inter-organizational coordinating bodies (Matinheikki et al., 2017) Create a common workplace to support consistent interaction (Matinheikki et al., 2017) Prevent the vision from becoming rigid by scheduling specific meetings across actors to allow learnings from experimentation to feedback expectations (van der Laak et al., 2007)	Existence of bodies who furnish communication and effective cooperation between organizations Existence of a common workplace Quality of the common workplace Meetings to discuss and learn about the progress, difficulties and impressions of other actors on the project Possibility for visions and expectations to be flexible and adaptable	have a saying, or is it decided by a few? Why? Could you describe how the coordination between all the organizations looks like? How is efficient coordination between the parties ensured? How do you think coordination could be improved? How would you describe communication between the parties? Are there any specific bodies who facilitate coordination and communication between parties? -> Why? -> What is your opinion on such a body? How is interaction between parties facilitated and promoted? How do you think this could be improved? Are there any possibilities for parties to work in a shared space among other parties? What is your opinion on such a common workplace? How do you picture such a workplace? How would you describe the evaluation process of the project? How do you reflect on the progress and difficulties of the project with the parties? -> How does this affect the vision of the project To what extent do you think visions and expectations about the project should be flexible? How do you think visions and event the parties? How do you think visions and event the parties? How do you think visions and here project the project how do you think visions and expectations about the project the project how do you think visions and expectations about the project should be flexible? How do you think visions and event the parties?
	Formulate tangible expectations, which are not just promising ideas but backed by research and earlier experiments (Coenen et al., 2010) Formulate specific expectations, which are not just sketches, but enable falsification and definition of the next steps in the project (Borup et al., 2006) Stage public trials to show the general public and policy makers what to expect from the project (Haugland & Skjølsvold, 2020) Organize public hearings to give the public the chance the participate in decision- making processes (Haugland & Skjølsvold,	Expectations are clearly formulated Expectations are based upon earlier research or experiments Expectations are clearly and narrowly delineated Expectations are falsifiable Expectations include the next steps in the project Activities organised to show the general public and policy makers in case development Citizen participation facilitation/activities in case	<ul> <li>for change?</li> <li>What are your expectations regarding the progress of the project? On what do you base these expectations? Do you base them on research or earlier experiments? What do you think are expectations of the general public on the project? To what extent do you think it is important that expectations are tangible and come across as valid? How do you think these expectations can be formulated so that they are more tangible?</li> <li>To what extent do you think it is important that expectations are specific and falsifiable? How do you think these expectations can be formulated so that they are more tangible?</li> <li>How are expectations conveyed to the general public? How are expectations conveyed to policy makers? Are there any specific activities to show the general public and policy makers about the progress of the project? What kind of activities?</li> <li>How would you describe the role of citizens in the project? What is their role in the decision-making process? How are they included in the project?</li> </ul>
Learning	2020) Engagement in self- reflection by project promoters themselves to ensure a level of learning high enough to enable others to learn (Bögel et al., 2019)	Activities = operationalization	Which role does self-reflection play for you? What do you reflect on? Do you feel like you ever help others in the project to learn (from each other)? Are you using any concrete learning frameworks to foster learning from experience, either for yourself or for others? If yes, how do you feel it helps? If no, do you think it would help and why?





Apply learning framework that foster second-order learning processes in experiential processes, such as the Reflective Learning Framework (RLF (Whalen & Paez, 2021)	5	
Provision of a neutral and safe space in which participants can openly express their views and learn about each other's views (Culwick et al., 2019 Ensure that participants understand each other's terminologies (Culwick et al., 2019) Ensure that network actor have congruent worldview and initial interpretative frames (Brown & Vergragt 2008)	Feeling of psychological safety to express an opinion or ask a question Clarity about other actors' terminologies Agreement of worldviews and position of the PED therein Agreement of s interpretative angles through which the PED , is viewed	<ul> <li>When you are in meetings and discussions with your colleagues, do you feel safe enough to state your opinion, even if might draw disagreement? To ask a question even if you think others might think it's stupid? Why? If yes, what gives you this feeling? If no, what prevents you from having this feeling?</li> <li>Do you ever have the feeling that you don't understand what somebody else is talking about? Do you ever feel that others don't understand you? Why? Was there ever an occasion in which you learned to understand somebody else? Tell me about it.</li> <li>How would you describe your general worldview? How does the PED project fit into this worldview? Did aspects of your worldview change and/or the project? If yes, tell me how that came about. If you had to explain to me what a PED is about in 3-4 sentences, what would that explanation sound like? What would your explanation have been like at the beginning of the project? If it changed, why? If not, why not?</li> </ul>
Formalize collections of individual experiences into higher-level processes (Evans et al., 2021) Experimental, intentional deviation from existing processes and project management approaches and re-embed successful experiments into existing processes and management practices (Bresnen et al. 2004)	Efforts to derive collective learning from individual experiences Active management of project processes Conscious learning and development of processes in the project	Can you explain to me how you designed the processes you are using in the project? Did you take an effort to include the experiences of individuals in shaping these processes? How does the re-evaluation of your processes look like? To what extent would you deem the processes you use within the Buiksloterham project as compatible with the processes of your organization? Which barriers do you see in moving the Buiksloterham processes to your organization? How could those barriers be overcome? Have any processes of Buiksloterham already been embedded into your organization?
Evaluation of KPIs themselves instead of mere evaluation of outcomes based on KPIs (Patel et al., 2017) Constant iteration of the decision making → monitoring → assessment → new decision process o micro and higher levels (Williams & Brown, 2014)	Evaluation of KPIs Execution of decision making → monitoring → assessment → new decision process	How do you monitor the progress of the project? How do you evaluate it? If you look back at the evaluation tools you used in hindsight, would you say that they made sense? If you had to evaluate again, would you use the same KPIs? Why? In your opinion, what could a good process look like to arrive at the best possible KPIs? When you take decision, how do you then proceed with this decision? How do you evaluate if the decision was correct? What do you learn from such an evaluation? Do you feel that this process could be improved?





## Appendix 2: Interview guide

Name Interviewee: ...... Place and time of interview: ..... Interview conductors: ..... Transcriber: .....

Thank you for taking the time to participate in our interview. This interview will serve to gather data for our research project, which aims to advice the AUAS on how to guide the most important and essential processes for the development of the PED pilot in Buiksloterham. The interview will take around 60 minutes, in which we will ask you several questions about the more specific project of *`Establishment of local energy communities with market access'*, as we are using this intervention as a case study for our research. This means that unless we specifically state something else in a question, all questions should be understood in the context of this specific project. More specifically, we will ask you questions related to the parties involved in the project, visions and expectations regarding the project, and learning processes which are taking place among the parties. The interview is conducted to gather data for our research only, in which the data will remain anonymous and undistributed. Furthermore, there are no right or wrong answers, so feel free to elaborate extensively. Do you have any questions before we start?

Now that everything is clarified, do I have your consent to start the interview and **record the answers** for later analysis purposes?

- 1. Could you describe in a couple of sentences what, in your opinion, in general an energy community entails?
- 2. Could you describe what the intervention 'local energy communities' entails?
- 3. How would you describe your personal role in

the intervention 'local energy communities' and in the broader project of ATELIER? 4. How would you describe the role of your organisation in

the intervention 'local energy communities' and in the broader project of ATELIER?

### Visions and expectations

Visions

Definition visions (if needed)

Visions is about what you want to achieve with the project in the end and which impact you would like it to have

Define expectations:

Expectations are about how you expect the intervention to work out.

- 1. What is the vision of your organisation on the intervention of local energy communities?
- 2. To what extent do you think this vision complies/differs from the general vision on the intervention of local energy communities?
- 3. Could you elaborate on how you have formed such a vision and how the vision evolved?a. In hindsight, do you think that process should have gone differently?
- 4. How do you think the formation of the vision on the intervention should go in the future?
- 5. How do you think that could be reached?

a. If nothing is mentioned about a shared vision: what would change in the intervention process if you had a shared vision? Wat would be needed to reach a shared vision?





- 6. What is the vision of your organisation on the broader project of ATELIER?
- 7. What are the expectations of your organisation on the intervention of local energy communities?
- 8. How were these expectations formed?
  - a. Optional: To what extent are expectations about the project tangible and based on research or earlier experiments?
- 9. How is the progress of the project communicated to the general public? *If relevant, repeat questions for ATELIER.*

### Actor network formation

1. Who are the other organizations that you are collaborating with in the context of the Energy communities intervention?

2. How did this group of organizations assemble? If interviewee does not know how organizations assembled: How do you think such a process of assembling organizations should happen, in general?

3. In hindsight, would you say that the formation of the organization network should have happened differently, both in terms of which organizations are included and in terms of the process?

*If interviewee does not know how organizations assembled:* Skip this one and put more focus on the question on the future

4. If you look more into the future, how do you think the actor network should be managed and what is your organization's role in there? Which results do you expect from that?

5. How do you think that could be reached within the intervention?

### Learning processes

The final big process that we are going to look at is learning. By this, we mean learning on a somewhat higher level, so not just accumulation of facts and data, but learning about processes, meanings, and convictions.

- 1. Please explain to me how learning looked like in the course of the project so far. You can think of events aimed at learning, personal reflection, learning by doing, learning by interacting with other organizations or other means of learning.
- 2. What would you say what you have learned so far? If interviewee didn't learn anything: Why?

3. What, in your opinion, is the most important thing that needs to be learned in a project like Buiksloterham/Energy Communities?

- 4. In hindsight, would you say that any learning processes should have happened differently?
- 5. How, in your opinion, does learning need to look like in the future to ensure that the energy communities intervention will be concluded successfully?
- How do you think that could be reached within the intervention?

Thank you for answering all our questions. This was everything we wanted to ask from our side, do you have anything that you would like to add?

Do you know other actors involved in the intervention who would be interesting for us to be interviewed?

Could we contact you after the interview if anything is not entirely clear afterwards?





## Appendix 3: Coding tree



Figure A: Coding tree from node 'o.General'







Figure B: Coding tree from node `1. Actor network formation'







Figure C: Coding tree from node '2. Visions and expectations'







Figure D: Coding tree from node '3. Learning processes'



## Appendix 4: Agendas

### 4.A Solution Fair Agenda

Setup: The representatives of each intervention, work package, or city need to prepare 2-3 problems that they are facing. These problems will be discussed in smaller groups with representatives of other interventions, work packages, or cities to find a solution together and learn from each other.

Table B. Agenda suggestion for a solution fair.

Duration	Content
10 min	Introduction of the session. The session leader gives an introduction and explains what is going to happen. All groups
	give a quick overview of their problem.
3 x 30 minutes	Split into smaller, mixed teams. One representative of each group stays with the group's problem, while all others join another group's problem to collectively find solutions. The representative of the problem owning group is responsible to lead the discussion and document the output.
30 minutes	Conclusion of the session. To conclude, all groups quickly present to the others which solutions they are taking home and what they learned.

### 4.B Visioning Exercise Agenda

Setup: This exercise should be conducted on the intervention level with not more than 5-6 participants. The goal of the session is for all present participants to agree on a common vision of their respective interventions. While there needs to be one leader of the session, all opinions must count equally, and the intervention leader should abstain from imposing his or her opinion onto other participants.

Table C. Agenda suggestion	for a	visioning	exercise.
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Duration	Content
5 min	Introduction of the session. Session leader explains what is going to happen. If necessary, a brief overview of the intervention is given.
10 minutes	All participants are given small pieces of paper. Without talking to each other, participants write down what they personally would like to see achieved at the end of the project. After 10 minutes, all participants throw their pieces of paper into the middle
10 minutes	The content on all papers is consolidated together. The pieces of paper are grouped according to the topic they address.
15 minutes	Open discussion on the content of the papers. Particularly, it should be addressed which points participants agree and disagree with. Based on this, a common set of statements that everbody agrees on should be formulated.
15 minutes	Consolidation of set of statements into one coherent vision that can be formulated in an easy-to-grasp manner.





5 minutes

Outro of the session. Session is reflected on a higher level, metalearningsare consolidated.





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