THE EMERGENCE OF ENERGY DEMOCRACIES IN MICROGRID AND SMARTGRID PROJECTS

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I. ABSTRACT

The Dutch energy system is still mostly relying on fossil fuel and it is still characterised by a top-down approach, that goes from the energy company to the final consumer. Nevertheless, microgrid and smartgrid projects can represent a valid starting option to pass on renewable energies while democratizing the renewable energy sectors. This thesis aims to contribute to the understanding of the emergence of energy democracies both in the practice of four different projects, and in the visions of their main stakeholders. This is done by analysing three constitutive elements of microgrid and smartgrid projects – ownership and control of energy flow, the RET and the grid, prosumerism, and project sphere – and by interviewing both the residents and the developers of the projects.

One of its main result is the identification of three possible types of energy democracies in microgrid and smartgrid projects: "activist energy democracy", where the residents are fully responsible of the project and actively participate to it; "marketized energy democracy", a type of democracy which is oriented to the development of a local energy market; "community's energy democracy" which aims to empower the inhabitants of the village in which the project takes place.

II. ABBREVIATIONS

CVPP:	Community Virtual Power Plant
CWI:	Centrum Wiskunde & Informatica
DPL:	Duurzame Projecten Loenen
DSO:	Distribution System Operators
EU:	European Union
LEN:	Loenen Energie Neutraal
LVPP:	Loenen Virtual Power Plant
RET:	Renewable Energy Technology
VPP:	Virtual Power Plant

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Introduction

Energy democracy is a relatively new concept that has assumed the form of a political buzzword when talking about energy transition paths. The claim to energy democratization started with the German Climate Justice movement who was addressing climate justice, transition to renewable energies and resistance to fossil fuel (Weinrub, Giancatarino, & Cuevas, 2015). Nowadays, even though a more precise definition of the term is still been developing, energy democracy is mostly recognised as a social movement that aims to develop a decentralised and decarbonised energy system while changing the power imbalances with a democratic, fair and just distribution of resources (Burke & Stephens, 2018). Energy democracy recognises opportunities in renewable energy technologies and targets the system as a key political space where a shift of power over different aspects such as generation, distribution, finance, technology and knowledge, needs to happen (Burke & Stephens, 2018). Indeed, throughout time, our society has been developing fixed patterns to structure the complexity of the energy flow and until now, the infrastructure, the legislation and the market have been working within these patterns. However, in order to move from a fossil fuel to a more sustainable alternative future, a radical change will not be able to conform to these fixed patterns and existing organisations and instead, the whole system will have to change (Ministry of Economic Affairs of the Netherlands, 2016).

Yet, a system's change and the implementation of a new way of energy provision and distribution come as a challenge.

The Dutch energy system is still, for large part, dependent on fossil fuel when talking about power generations and it is dominated by few large companies in terms of distribution, production and supply of the energy (Export.gov, 2018). Therefore, even if the Dutch government is taking some action to meet the European goals to shift towards an alternative renewable

system, the law and an old rooted energy system represents a barrier to a transition towards energy democracy.

Despite this, microgrid and smart grid projects can represent a valid starting option to democratize renewable electricity sectors. Microgrid and smartgrid are both new sustainable infrastructures that can represent a valid technological advancement to help the transition towards a new energy system. In particular, a microgrid is a small grid that supplies power to a small part of the city and it works in parallel with the national electricity grid (Mengelkamp, Gärttner, Rock, Kessler, & Orsini, 2018), and a smartgrid can be applied to any grid and it has the ability to respond automatically to variations in electrical parameters, responsible for the smooth functioning of the grid (Gharavi & Ieee, 2011).

The reason why both microgrids and smartgrids can democratize the renewable electricity sectors is that they can facilitate distributed control of the electric grid, and by its means they can reduce energy costs, favour community control and ownership of renewable energy and promote greater accountability (Burke & Stephens, 2018). Nevertheless, energy democracy would still be a challenge within these projects. In particular, the involvement of multiple stakeholders, from house owners to network operators and from energy producers to different public authorities, can be problematic as each of them comes with different interests. Therefore, even though together they can create "new energy alliances" (de Bakker, 2016) that can foster a new type of cooperation, they can also have different takes on what energy democracy represents. On one hand, the house owners can look at the concept as a way to regain control over a natural common resource and create a new energy provision model which would empower them. On the other hand, the energy supplier can see energy democracy as a new market opportunity. In fact, although the main actors of the current Dutch energy system are willing to offer solutions that can help democratization (Stedin Group, 2017; Turèl & Alphen, 2016), they can have different interpretations compared to the house owners of what democratisation of the infrastructure really means.

This research project thus seeks to clarify which energy democracies are being advanced, taking into account the difference in interpretations. By studying the emergence of energy democracies in the practice of microgrid and smartgrid projects and in the visions of the stakeholders taking part to the same projects, it will be possible to understand *if* and *how* energy democracy takes shape and is understood in these projects. Finally, the study will also contribute to the theorization of energy democracy in the context of microgrids and smartgrids, by providing a conceptual framework of the term.

Research Aim and Research Questions

The aim of this research is to contribute both to the understanding of the emergence of different energy democracies in the operationalisation of micro and smart grid projects and to the identification and the analysis of the different interpretations of energy democracy by the project stakeholders.

Based on this research aim, the thesis will answer to two main research questions related to the practice and the visions on energy democracy.

On one hand, analysing the practice on energy democracy can give a first glance on the different modalities through which the concept takes shape in microgrid and smartgrid projects. On the other hand, the visions on energy democracy by project stakeholders add to the previous analysis by providing meanings behind those different modalities. Moreover, as the interpretations of the different stakeholders can either hinder or encourage the emergence of energy democracies in microgrid and smartgrid projects, they can also give a hint on the future of energy democracies in those projects.

The first research question looks into the practical ways in which different energy democracies are being advanced in the projects:

1. How are different energy democracies developing in practice in microgrid and smartgrid projects?

The practice of energy democracies will be discussed by analysing two constitutive elements of microgrid and smartgrid projects that will be

presented in the conceptual framework chapter. Therefore, to be able to answer to this first research question, the following sub questions investigates these last elements, namely the ownership structure and the project organisation:

a. How do different ownership structures enable different energy democracies in micro grid and smart grid projects?

b. How do different project sphere structures enable different energy democracies in microgrid and smart grid projects?

On the other hand, the second main research question examines the interpretations on energy democracy by different stakeholders:

2. How are different energy democracies emerging in the visions of the stakeholders in microgrid and smartgrid projects?

In order to answer to the latter, it is interesting to both study the differences and commonalities of the interpretations on energy democracy, and the visions on prosumerism, the subject of energy democracy. Therefore, the research will study the following sub questions:

a. How do the visions on energy democracy by project stakeholders differ or conform with each other?

b. What are the recurrent themes in the visions on energy democracy by project stakeholders?

c. What visions on the prosumers are present in the different microgrid and smartgrid projects?

Thesis Structure

This thesis is divided in five chapters excluding the introduction and conclusion, and it proceeds as follows. The first chapter outlines the conceptual framework, displaying the state of art of the concept on which the thesis is constructed, and the energy democracies framework used in the empirical chapters. The second chapter delineates the methodology of the research, including data selection and collection, outlining the procedure followed to deliver the results of this thesis, as well as the methodology

employed for the analysis of the data. The third chapter contains the analysis of the two constitutive elements of microgrid and smartgrid projects – ownership and project sphere-, therefore, the results on the practice of energy democracy. In this chapter, the analysis prepares to the answer to the first research question. The fourth chapter elaborates on the results on the visions of energy democracy, by analysing both its recurrent themes and the role of the prosumer in microgrid and smartgrid projects. The chapter that follows is the discussion chapter, through which the thesis explores new understandings and insights in light of the findings.

Finally, the conclusion recapitulates the focal points of this thesis and provides an answer to the research questions outlined in this introduction.

1. Conceptual Framework

This chapter introduces the conceptual framework which lays out the basis for answering the research questions and attaining the research objectives. The conceptual framework represents a system of concepts that offers a logical structure to identify and construct the approach to the research (Grant & Osanloo, 2014). In order to give context and form a conceptual approach to study the empirical data, the conceptual framework first discusses the concept of energy democracy as it has been debated by scholars. In this attempt, from a political theory point of view, it also examines the multiplicity of perspectives through which energy democracy can be studied. From there, the conceptual framework delineates three elements through which it is possible to study energy democracy in different microgrid and smartgrid projects, namely ownership and control, prosumerism and project sphere.

1.1 Literature review

1.1.1 Energy democracy

As the concept of energy democracy arises from social movements, its body of literature is less established in the academic debate (van Veelen & van der Horst, 2018). Nevertheless, different scholars have recently started to give a substantial contribution to the topic. Energy democracy is seen through many different perspectives which look at it in various ways such as a framework for political action (Angel, 2016), as a social movement (Burke & Stephens, 2017), as a process (Szwed & Maciejewska, 2014) or as a political concept (Szulecki, 2018). Within the activist scholars, energy democracy is mostly recognised as a social movement that aims to develop decentralised and decarbonised energy systems while changing the power imbalances with a democratic, fair and just distribution of resources (Burke & Stephens, 2018). In this perspective, the German Rosa Luxemburg Foundation sees

energy democracy as a set of principles that promote decentralisation and independence from energy corporations by pushing for a democratic restructuring of the energy sector (Angel, 2016). Along the same lines but yet with a different target point, the Trade Unions for Energy Democracy consider it a trade union strategy, essential to energy transition and built around three objectives: resisting large energy corporations, reclaiming to the public what have been privatized and restructuring the global energy system (Sweeney, 2013). On a different conceptual level, the Polish politician and social activist Dariusz Szwed intends energy democracy as a process through which civil society can regain control and power over common resources (Szwed & Maciejewska, 2014). Indeed, different activist usages of the term energy democracy cover different elements, from resistance to fossil fuel corporations, to decentralisation of the energy system, to a shift in the decision-making power towards communities and workers, to community ownership and shared leadership. However, as Szulecki (2017) suggests, all these definitions lack of a red thread and more in-depth foundation in political theory. Angel (2016) seems to also agree that there is no clear definition of energy democracy, but only a general usage of the term from civil society organizations that link decarbonisation processes with changes in the control of the modes of energy production and distribution.

1.1.2 Energy democracies

If these last contributions confirm the relatively underdevelopment of political theorisation on energy democracy, on the other hand it can be said that energy democracy can still be associated to more participative forms of democracy rather than institutional ones. In fact, themes such as decentralisation, bottom up approach and redefinition of power relationships suggest a more local and active participation from the people in order to influence the decision-making process and make it more accountable (V. Kumar, 2017).

Nevertheless, the theorisation on energy democracy shows a wider overview of concepts that can be found in different forms of democracy. For example, the self-governance element of energy democracy is emphasised in associational democracy, the element of deliberation in the decision-making

process is addressed in deliberative democracy, the empowerment of nonstate actors in response to a loss of trust in the state's agency is suggested by reflexive democracy and the concern of access to and the engagement with the resource is linked to material democracy (van Veelen & van der Horst, 2018). Hence, it can be said that the concept of energy democracy is characterised by different key elements that go beyond one form of democracy and one general definition.

Therefore, because this research has the objective to understand how energy democracy is being done and understood in microgrid and smartgrid projects, energy democracy will not be addressed as a one, static definition. Instead, this research will speak about energy democracies, as in these different projects, different types of energy democracy could emerge, depending on which of the above elements the project relies the most.

1.2 Energy democracies framework

In order to analyse the empirical data and answer the two research questions about practices and visions on energy democracy, for this study a framework was developed to understand energy democracies through three constitutive elements of micro grid and smart grid projects:

- The object of the project, namely the management of the energy flow, the RET and the grid;

- The subject of the project, that is the prosumer, often addressed as energy citizen;

- The operationalisation of the project, understood as the process of decision making, deliberation and participation.

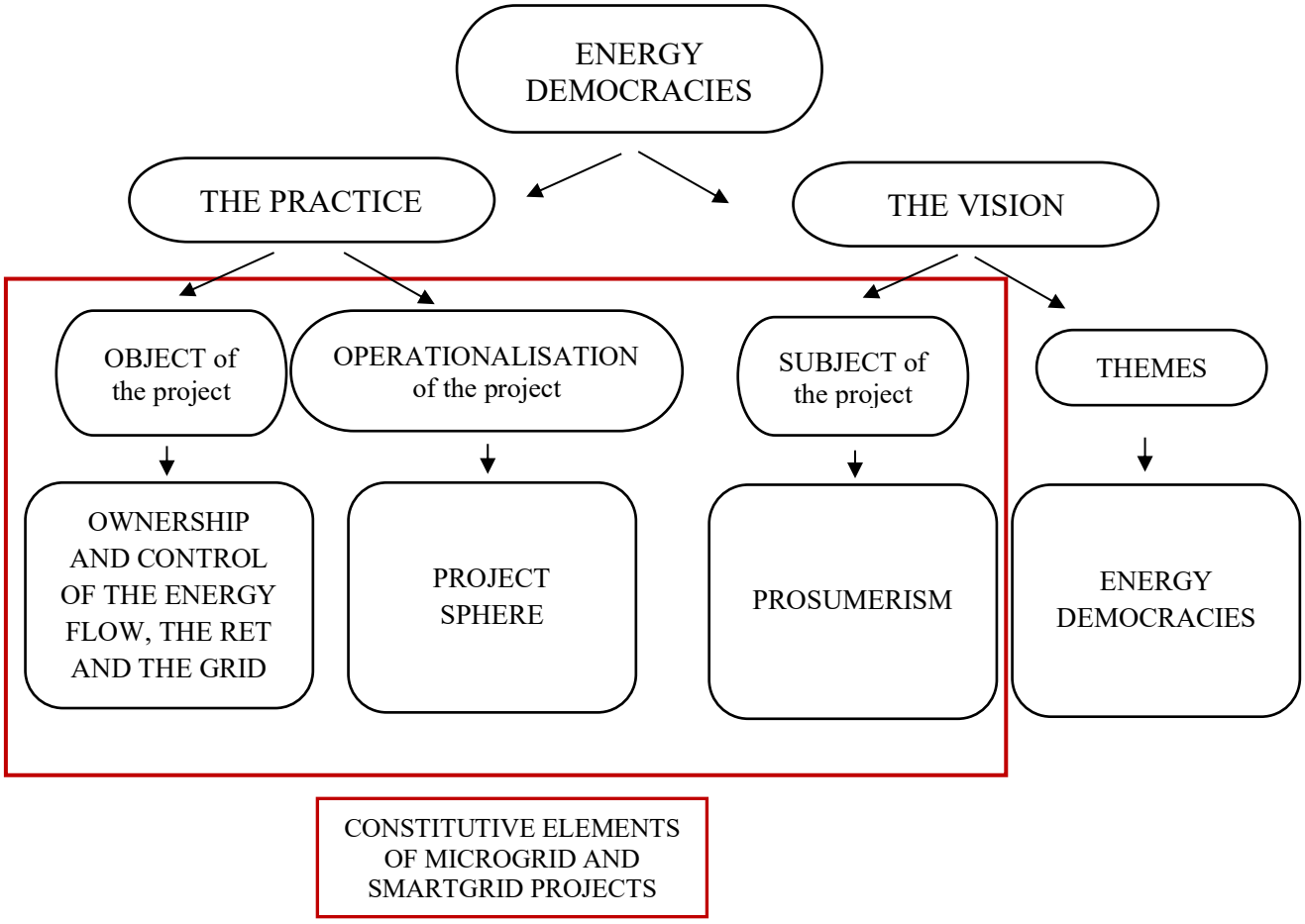

Figure 1. Answering the research questions by using the framework[1]

[1] The figure above explains how the energy democracies framework can contribute in answering the two research questions about the practice and the vision of energy democracy in microgrid and smartgrid projects.

1.2.1 The object: ownership and control of the energy flow and the RET and the grid

To understand how different management of the energy flow, the renewable energy technologies (RET) and the grid characterise different energy democracies, the research studies its ownership and control. In fact, ownership is a critical dimension behind the process democratization as it concerns the control of the resource both financially and politically (Moss, 2014). In particular, increased civic, community or public ownership of both the hardware and energy flow is broadly considered to be one important element of energy democracy (Kunze & Becker, 2015; Morris & Jungjohann, 2016; Szwed & Maciejewska, 2014).

In order to describe the ownership models in micro grid and smart grid projects, the research regards to three ownership models, namely public ownership, private ownership and citizen ownership. The ownership's categorisation draws on Walker and Cass' framework (2007) on the modes of renewable energy implementation, each of which is characterised by one ownership model.

According to Walker and Cass' framework (2207), *public ownership* occurs when a public utility owns the infrastructure. The Netherlands has been always reluctant to privatisation and this is why public ownership is still common, at least for all network-related functions: the state-owned company TenneT currently owns and operates the transmission network, and utility companies owned by the municipalities and provincial governmental institutions operate the distribution networks (Künneke & Fens, 2007).

In the same framework, *private ownership* can be found when the national electricity grid has been privatised (Walker & Cass, 2007). For this category, the range of stakeholder involved in the ownership model is wide and it can include organisations or intermediaries that deal with generation and supply but also that handle the development and the management of particular facilities. The model consists in a private capital funding with returns to shareholders. The energy returns to the national electricity grid, but the "green" electricity becomes a distinct commodity that customers can purchase at specific tariffs (Walker & Cass, 2007).

As regards to *citizen ownership,* the study understands the term through its narrow sense, as in the literature this type of ownership is often linked to other terms such as energy cooperatives, community energy, local ownership, community ownership, small private investors, citizen participation etc. (Schreuer & Weismeier-Sammer, 2010). In this sense, citizen ownership includes different ownership models at its core (Enzensberger, Fichtner, & Rentz, 2015; Schreuer & Weismeier-Sammer, 2010). Enzensberger et al. (2015) establish three types of citizen ownership considering three type of local citizen investors and considering whether it is individual or collective ownership and citizen or professional project-lead:

- private individuals owning and managing the renewable energy facility by themselves;

- small private investors that own shares within a cooperative lead project;

- small private investors that own shares of a project developed by professional project developers.

Therefore, *community ownership* as understood in Walker and Cass' framework (2007), can be incorporated in citizen ownership. The infrastructures are smaller scales and locally appropriate compared to the ones in public ownership and private ownership. Part of the infrastructure can go off-grid, and thus prosumers can decide to supply energy to single or group buildings or they can supply locally and feed-in the electricity excess to the national grid. If they are only grid connected, they only supply the national electricity grid. For this ownership model, the technologies can be collectively owned through cooperative share ownership or they can be managed by existing local authorities or community institutions with partnership arrangements (Owen, 2004).

1.2.2 The subject: prosumerism

Taken the lens of energy democracy, the subject of the microgrid and smartgrid projects is the prosumer. The literature on this subject is fragmented and the role of the prosumer is seen from different perspectives. For the scope of this research, three main streams of perspectives are identified.

The first stream sees the prosumer as an important actor that can contribute to flexibility and, demand and supply balance (Kubli, Loock, & Wüstenhagen, 2018), discussing the role of the prosumer mostly from an engineer and technological point of view (Olkkonen, Korjonen-Kuusipuro, & Grönberg, 2017). With the increasing usage of renewable energy technologies (RET), power generation and distribution became intermittent and difficult to predict. For this reason, through distributed storage devices (DSD) and digitalisation, the prosumer helps in decreasing the power peaks in the electricity grid and improve the balance of the energy supply (Luo, Itaya, Nakamura, & Davis, 2014).

At European level, this conceptualisation has also been discussed. In particular, the European Parliament briefing of 2006 defined a prosumer as "a consumer who both produce and consume electricity" (Šajn, 2016: 2). The definition highlights the two elements of production and consumption: prosumer is someone who self-consumes the energy that he produces while selling back to the grid the excess, and prosumer is also someone who can buy power from the electricity grid when he has a short of energy. Therefore, this first stream of perspective on prosumerism emphasises the prosumer as a figure who simply generates and supplies renewable energy to other subjects.

The second stream of conceptualisation thinks at the prosumer as a new player in a decentralised energy market (Hancher & Winters, 2015). The energy market liberalization at the EU level allowed and facilitated the development of this stream of prosumerism by transforming the prosumer from a mere user to a fully engaged market participant (Kersyte, 2018). Nowadays, the prosumer has a new role in the economy of the energy system as it is no longer a simple consumer but also a producer and possibly, a supplier. As a result, the prosumer also takes on new responsibilities. A.

Toffler in his book The Third Wave, published in 1980, already mentioned the new economic role of the prosumer in the energy system. In fact, prosumers take up a new role by investing in energy production and infrastructure, a role that, in the past, belonged to the supply industry alone (Toffler, 1980).

ClientEarth and Greenpeace (2016) as well, refer to prosumer with the acceptation of active energy consumers that can participate in the energy market by individually or collectively producing renewable energy. They also interpret their participation to the market as a contribution to the energy efficiency and to the management of the energy system (Connolly & Roberts, 2016).

Therefore, this second stream of prosumerism emphasises the prosumer as a new economic subject that can invest on renewable energy and sell the energy that he produces.

The third stream on prosumerism sees the prosumer as a new political subject (Szulecki, 2018). This conceptualisation, compared to the previous ones, emphasises the element of energy citizenship by considering it as a new political subject to be empowered with new needs, rights, obligations and duties. In fact, in this definition, prosumer refer to the subject as "energy citizen", as the process of energy transition is developing a new regime of rights together with new duties and obligations related to environment and sustainability, resulting in new forms of citizenship (Flynn, Bellaby, & Ricci, 2008). Toffler (1980) as well, also underlined the civil part that the prosumer can play in the energy system, by recognizing them as members of a democratic society and, in addition, as subjects with new responsibilities and powers within the energy system.

1.2.3 The operationalisation: project sphere

With this element, the research aims to analyse how the participants are involved in the decision of the setting and the development of microgrid and smartgrid projects.

Radtke (2014) argues that the effectiveness of community energy initiatives can be found in civic participation and engagement and on the relationship between people and organisations involved in the negotiation of the energy policy and politics changing landscape. Drawing on Devine-Wright (2012) methods of engagement in the decision-making process about renewable energy, the study first looks at the degree of public engagement. In fact, engaging in this process is important in vision of "collaborative" forms of planning (Devine-Wright, 2012) which differs from other models of planning based on technocratic conception of decision-making (Pennington, 2003). In the context of smart grid projects, it is considered important to involve the consumers in order to make them assume the role of an active participant in the energy system (Gangale, Mengolini, & Onyeji, 2013). Devine-Wright (2012) indicates three different means to engaging the public: information provision, consultation and deliberation.

The first procedure - *information provision* – is a one-way flow of information and it is considered to be the minimum level of public engagement as it informs people when plan have already been made. For this reason, it is unlikely that will have positive outcomes in terms of encouraging support and trust. This form of engagement usually involves distributing leaflets, advertising and providing exhibitions (Devine-Wright, 2012). Devine-Wright (2012) refers to Arnstein's conceptualisation of the "ladder of citizen participation" (1969) to explain how this type of engagement procedure is usually used to "educate" a public which can give an illusionary form of participation.

Compared to the previous one, the second procedure - *consultation* – allows the participant to have a role in the decision-making process. The one-way flow of information becomes a dialogue between the people and the developer. Consultation allows questions and responses and it allows people

to support or oppose particular projects depending on certain conditions (Devine-Wright, 2012).

The third means to engage the community is *deliberation*. This procedure is based on public participation where the public not only can discuss the plan, but it is also involved in its development. This decision-making process reflects the views of the community and it allows to build consensus, through citizens' juries, interactive panels, workshop and conferences (Devine-Wright, 2012). Bell et al. (2005) consider this means to be a way to overcome democracy deficit in renewable energy decisions.

In discussing these three forms of public engagement in the decision-making process, the research also examines the different roles that the participants can take in the decision-making process. Walker and Cass (2007) differentiate the public based on five modes of renewable energy implementation. This study considers the roles of Walker and Cass (2007) framework, that are involved in renewable energy projects.

- *Service users* use energy provided by renewable technologies. Usually this role can be found in demonstration project, where the participant may not know the derivation of energy.

- *Project supporters* who actively engage in renewable energy projects although support can be not visibly organised.

- *Project participants* who get involved in community modes of implementation. They are usually members of organising groups, boards, or foundations, they attend meeting and have a say on installation and maintenance of the RET.

- *Technology host* are owners of the buildings, but they are not the owners of the renewable energy technology itself.

- *Energy producer* who owns and operates generation technologies.

2. Methodology

This chapter discusses the methods of this research, namely the data collection and the data analysis. In order to answer the research questions, the results draw on four case studies whose selection is reviewed in the first paragraph of this chapter. Following, the chapter describes the data collection methods and it explains the data analysis in order to explain how the data were interpreted. Finally, it shows some limitations of the research design.

2.1. Case studies

In order to contribute to the understanding of the emergence of different energy democracies in smartgrid and microgrid projects, this research provided an in-depth analysis of four case studies, namely Schoonschip, Loenen Virtual Power Plant, Hoog Dalem 2.0 and City Zen. The four case studies were selected within renewable energy projects or pilot projects in which new technologies, such as microgrid and smartgrid are tested. Moreover, these four cases were expected to contain different energy democracies, as the setting and development of the projects were different among each other. Lastly, the third criterium was mainly a practical one and it relates to the accessibility of the data. In fact, some of the projects selected in the first place, were not available for interviews or did not want any researcher to study the case.

At the beginning of the research process, the multiple-case study had also an explorative purpose which was to get to know the context. Eventually, in a later stage, it enabled to explore the differences within and between cases, to understand in which ways energy democracy emerges in the different projects.

This methodology also contributed to the second research objective, namely to contribute to the identification and analysis of the different visions

of energy democracy. In fact, the multiple case study was also instrumental (Stake, 1995), as it was used to understand how different stakeholders among the different case studies envision energy democracy.

	SCHOONSCHIP	LOENEN VIRTUAL POWER PLANT	HOOG DALEM 2.0	CITY ZEN
Purpose	Setting up an independent energy community	Setting up a Loenen CVPP, owned and managed by the inhabitants	Setting up a local energy market	Proof of concept
Technology	Microgrid and smartgrid	Community Virtual Power Plant (CVPP)	Smartgrid	Smartgrid
Initiative	Community neighbourhood initiative	DPL initiative	Community and developers initiative	Developers initiative
Where	Amsterdam	Loenen	Hoog Dalem	Amsterdam

Table 1. Projects' characteristics

2.2. Data collection

Stake (1995) and Yin (1994) recognised six sources of evidence in case studies: documents, archival records, interviews, direct observation, participant observation and physical artefacts. This research used two of them, namely documents and interviews. In fact, as primary data, semi-structured interviews were conducted and as for the secondary data, research reports, policy documents, law documents, journals, newspaper articles and web pages were examined. In particular, the latter contributed to formulate background information and together with the new outcomes from the primary data, they helped to achieve the research objectives.

2.2.1 Semi-structured interviews

In order to get information on the case studies, interviews are considered to be one of the most important sources (Tellis, 1997). In order to achieve the research objectives, 14 semi-structured qualitative interviews were conducted among the different stakeholders of the four projects. For this purpose, it was developed an interview guide, a written list of questions based on the topics of the conceptual framework, namely ownership, prosumerism, project sphere and visions on energy democracy. However, even though all interviews covered the same topic, the list of questions was not fixed throughout the research. In the first place, the questions were quite open in order to get as much information as possible. In the second place, the questions became more precise and in-depth. Lastly, the questions asked to both residents and developers were the same in order to triangulate the data sources.

To get into contact with the interviewees, chain-referral (snowball) sampling method was mostly used. For Schoonschip, I emailed the foundation on my account. At the time, the first residents were just moving into their new houses, therefore, it took quite some time to have the first response. The president of the foundation put me into contact with one of the residents, part of the Energy Working Group. He was the gatekeeper for this project as he was the one who put me into contact with the others three residents.

Regarding the second project, namely Loenen Virtual Power Plant, I was able to contact its gatekeeper, thanks to the contribution of the first supervisor of this thesis. The project manager of LEN – Loenen Energie Neutraal -, was the gatekeeper for Loenen Virtual Power Plant and Hoog Dalem 2.0. In fact, he put me into contact with all the interviewees in Loenen Virtual Power Plant, and with the ABB project manager in Hoog Dalem.

For Hoog Dalem 2.0, the project manager from ABB brought me in touch with Stedin project manager and with the two residents.

Lastly, I emailed the Alliander project manager. He then gave me the contact of his colleague in Amsterdam.

The fourteen respondents were both residents and developers of the four projects. To sum up, this research includes the interviews with four residents from Schooschip; two developers and two residents from Loenen Virtual Power Plant; two developers and two residents from Hoog Dalem 2.0; two developers from City Zen. Part of the interviews were conducted face to face either in the residents' houses or in a public space. Other interviews were conducted by telephone.

	SCHOONSCHIP	**LOENEN VIRTUAL POWER PLANT**	**HOOG DALEM 2.0**	**CITY ZEN**
N° Interviews Residents	Ron Nina Derek Gunnar	Aart Philip	Sander Pim	/
N° Interviews Developers	/	Alliander supervisor Qirion developer	ABB developer Stedin developer	Alliander developer Alliander project manager

Table 2. Number of interviews

2.1.2 Academic and grey literature

Regarding to the literature, academic and grey literature helped with the understanding of the topic and its context. In particular, the grey literature contributed to the identification of the case studies and the stakeholders involved through newsletters, website, position papers and reports. Academic literature, instead, was instrumental to understand how smartgrid and microgrid work, and to understand how the Dutch energy system functions. Articles were retrieved from Google Scholar and Web of Science.

At the fieldwork stage, the academic and grey literature facilitated the decision regarding the list of questions for the interviews. Lastly, when structuring the results chapter, the literature was used to triangulate some of the interviewees' statements.

2.3. Data analysis

The analysis of the data started during the fieldwork. In fact, each interview was transcribed in order to highlight the important statements and to make observation notes. These efforts helped with the analysis of the answers provided by the interviewees. Moreover, thanks to this process, the first results were put in light relatively soon.

At the end of the transcription, in order to structure the analysis of the data set, two different coding schemes (Appendix A) were constructed. The first coding scheme was a top-down scheme in the sense that the codes were created according to the concepts of the conceptual framework. In particular, this scheme was useful to interpret the data related to the first main research question about the emergence of the energy democracies in smartgrid and microgrid projects. In fact, it allowed to understand the results in the light of the conceptual framework. On the other hand, the second coding scheme was a bottom-up scheme as the codes were created by reading carefully the interpretations of energy democracy given by the project stakeholders. In this sense, for this scheme, the codes were just the collection of those interpretations and thus, it allowed to analyse the data related to the second main question about the visions on energy democracy.

After the development of the coding schemes, the software for qualitative research ATLAS.ti helped to apply the coding schemes and eventually, code the interviews. At the end of this process, the results were sorted by categories. In order to answer to the first main research question, they were categorised according to the four projects. On the contrary, to understand the different perceptions of energy democracy, namely the data to answer to the second main research question, the results were categorised according to the two main stakeholders' groups, the residents and the developers. This structure shaped the choice of the division of the chapters of this thesis.

Finally, in order to analyse the categorised data in light of a theoretical framework, this thesis had previously developed an energy democracies

framework. In this way, this work did not rely on any specific theory, but instead, it constructed its own framework from scratch. This choice was mainly taken for two reasons: the first one is that energy democracy is a new concept and its theorisation is still quite small for studying the topic in microgrid and smartgrid projects; the second reason is that the new framework helped in the understanding of energy democracy from the project point of view (in case of the practice) and with a bottom-up approach (in case of the vision).

2.4. Limitations

Especially in qualitative research, it is important to reflect and be aware of the limitations of the research design (R. Kumar, 2010). In particular, this research encountered three limitations.

Firstly, the time for this research was limited, as it is a master thesis. The study could have had more data by interviewing more residents and developers from different projects. This addition could have led to more consistent results to be able to generalise the findings.

The second limitation is closely related to the first one as it concerns not only the limited amount of people interviewed, but also the limited amount of interviewed stakeholder among the projects. In fact, the research focuses on two main stakeholders, namely residents and developers. However, the government and the municipality are also important stakeholders to consider in these initiatives as they are valuable sources of data. Moreover, for Schoonschip, only residents were interviewed because it was not possible to interview Spectral and the way around, for City Zen, only developers because it was an already completed pilot project.

The third limitation relates to the selection of the case studies. In fact, the case studies were supposed to be only microgrid projects, with similar characteristics. However, as microgrid is quite a new technology and the regulations does not allow its implementation in most cases, the selection

criteria were broadened up and smartgrid projects were included as well. In the other way, comparisons would have been easier, as the baseline data was similar.

3. Practice of energy democracy

This chapter aims to analyse the data that allow to draw conclusions on the practices of energy democracy within the four renewable energy projects. The first part briefly describes the different projects and for each case study, it illustrates the ownership model of the RET and the grid, and the control of the energy flow. In the second part, the chapter examines how participants are involved in the decision of the setting and development of the project, and the role of the participant in the different projects.

3.1. Ownership and Control

Schoonschip

Schoonschip is a new floating sustainable neighbourhood in Amsterdam-North, built between 2017 and 2019 (Schoonschip, 2016). Thanks to the Experimentation Decree, which gave to the neighbourhood's residents an exemptional status, Schooschip foundation was able to develop a microgrid, a small grid that allows them to disconnect to the national electricity grid and to trade self-produced energy among themselves. In fact, the Dutch government allows for experimental derogation from certain provisions of the Dutch Electricity Act and in 2015, the Crown decree for experiments with decentralised renewable electricity generation entered into effect. The aim of this decree is indeed to investigate how far these experiments can contribute to increasing DG, foster the efficient use of energy infrastructure and improve consumer involvement (Lammers & Diestelmeier, 2017).

As regards to the ownership of RET, Ron (2019), one of Schoonschip residents, explained that each household has a battery in the house and those are owned collectively by all the residents of Schoonschip. As this device is owned by Schooschip foundation, the ownership model is community ownership. However, Ron also said: "Actually for the solar panels I paid

myself, but the usage is collective" and he continued by saying: "That is an interesting thing, you have all that stuff on board, and it feels like this is my stuff you know, but the usage is collective" (Ron, 2019). The solar panels thus fall out the collective space, even though the management is collective.

However, because the energy system is not functioning yet, the residents still need to decide how to collectively use their energy. To this regard Derek, another Schoonschip resident, said: "If they buy my electricity, I don't know what I am going to get from that. Maybe in a virtual cryptocurrency and then maybe I will use their boat for a day or whatever, it can also be. Actually, we don't want to do it in money because we don't want to be ruled by money. So, we all want to participate together and give and take services. One is a photographer and the other one is a lawyer, dentist or doctor and the other is a good painter. So, you paint my house, I sell you a bit of energy. Something like that" (Derek, 2019). Therefore, future developments of the energy system will tell more about the control of the energy flow. Possibly, an alternative market will be created, where energy is not a commodity anymore.

With regards to the ownership of the grid, all the residents of Schoonschip own both the microgrid and the one cable that connects the households to the national electricity grid (Nina, 2019). Like the batteries, the grid falls under community ownership.

Lastly, concerning the ownership of the energy management software, all the residents of Schoonschip own the energy smart grid (Nina, 2019). They obtained a subsidy that they entirely gave to CWI, a research centre that is developing the algorithms for the smart energy system (Nina, 2019).

Loenen Virtual Power Plant

Loenen Community Virtual Power Plant is a European subsidised project that aims to create a community virtual power plant, owned and managed by Loenen, a village in the Province of Gelderland that aims to be energy-neutral and self-sufficient within twenty years.

The project is a community initiative as the Stichting Duurzame Projecten Loenen (DPL) – a Loenen foundation run by some of its inhabitants with the aim to promote sustainable development in the village – together with the

municipality of Apeldoorn and Loenen Energie Neutraal (LEN) applied and eventually received the European subsidy (INTERREG, 2019a).

Because the project was proposed by the community for the community, LVPP comes with a great sense of ownership. Aart (2019), the project manager of LEN – Loenen Energie Neturaal - calls it Loenen Community Virtual Power Plant in order to emphasise the fact that the virtual power plant will be owned by Loenen people and not by an energy company.

In one of INTERREG Newsletter, the virtual power plant is defined as "an ICT-based control system that coordinates a portfolio of distributed energy generation (e.g solar panels), energy storage systems and/or controllable loads (e.g. appliances that can shift their electricity usage in time)" (INTERREG, 2019b). As an addition, the community Virtual Power Plant has a community logic, in the sense that it is adopted by a place or a group of people in order to achieve community-based needs and values, such as fair distribution of benefits, community ownership, collective decision making, community engagement open membership (INTERREG, 2019b). In fact, in the future, the energy management software will be owned and managed by the community of Loenen (Alliander supervisor, 2019). Therefore, according to Walker and Cass (2007) framework, the ownership model is a community ownership, not only because the VPP will be owned by Loenen inhabitants but also because the community is called to choose the purpose of the VPP and its management.

As regard to the ownership of the grid, on the contrary of Schoonschip, the virtual power plant will still be connected to the national electricity grid, which means that the grid will remain public and managed by the DSO (Philip, 2019).

Moreover, concerning the ownership of RET, Loenen inhabitants own the solar panels and as for the batteries, it was not clear whether they will be owned by Loenen or by the developers.

Lastly, regarding the control of the energy flow, the VPP will manage the demand and supply of energy, enabling Loenen inhabitants to create a local energy market by trading energy among themselves.

Hoog Dalem 2.0

Hoog Dalem 2.0 is a neighbourhood initiative that wants to investigate the possibility to create a local energy market in Hoog Dalem, a Gorinchem district. The project builds up on the results gather from a previous pilot project, led by ABB and Stedin. In fact, when the pilot project came to an end, some of the residents asked ABB and Stedin to think about a way to deliver energy to the neighbourhood self-sufficiently (ABB developer, 2019).

At the beginning, they discussed about the role of the residents (ABB developer, 2019) and they set up goals to achieve with the project. Pim, the spokesman of Hoog Dalem residents, explained: "The goal of the energy company is: how can I make profit for thinner cables, so less costs, and to make people enthusiastic to trade energy among themselves without the energy company" (Pim, 2019). For the residents instead, there are three goals: to trade the energy within their own neighbourhood and help the community, to make profit from their investment, and third, to contribute to reduce co2 and fight climate change (Pim, 2019).

The 16 households that decided to go on with the project, are now participating without any costs (Pim, 2019). In particular, with regards to the ownership of RET, ABB provided the batteries to four residents free of charge (ABB developer, 2019). The ABB developer gave a reason for that: "I think that is also the incentive that we have given to the people to join us. So, the hardware is paid by ABB, the software and all the kind of development around the software is paid by the DSO" and he justified by saying: "Because otherwise, I think people would not pay the pilot, 50 thousand euros for it.

The benefit should be very high if they want to do an investment like that" (ABB developer, 2019). However, it is not clear whether the batteries will be handed over to the residents at the end of the project for free, if they will be withdrawn from the district or if the residents will pay a certain amount to keep them. Stedin developer (2019) thinks that they will most likely be given to the residents, but it does not mention whether with cost or without cost. On this note, Sander (2019), one of Hoog Dalem residents, complained about the fact that in the previous pilot the batteries were removed from the houses and that they were left with nothing: "In the first project like I said, the batteries

were gone at the end and I felt we were left with nothing so to say" (Sander, 2019).

Concerning the ownership of the energy management software and all kinds of its development, the smart grid is payed and owned by the DSO, Stedin (ABB developer, 2019). Therefore, because both the hardware and the software installed in the project are owned by the developers, the ownership model of RET is neither citizen ownership nor community ownership. Instead, it is private ownership of the two developers.

Finally, with regard to the control of the energy flow, Hoog Dalem 2.0 aims to be a local energy market in which the residents are in control. However, Stedin developer clarified that: "it is not peer to peer, for example you cannot trade to your favourite neighbour, but you trade on tax. It is more pure market trade… (more text) the participant will make a price list and of course price cannot increase above the normal price" (Stedin developer, 2019).

City Zen

City Zen is a European-funded project that started in 2014 in the two cities of Amsterdam and Grenoble. With this project, they wanted to investigate how sustainable development in cities can be developed and managed (Alliander developer, 2019). Thus, the objective was to develop and demonstrate energy efficient cities and to build a methodology and tools for cities, industries and citizens to reach the 20-20-20 targets (CITY Zen, 2014).

Part of the European project was the creation of a virtual power plant in Amsterdam Nieuw-West district by the City-zen partners Alliander, Energy Exchange Enablers (EXE) and Greenspread. The creation of the online platform was a proof of concept to test whether it is possible to predict patterns and steer battery according to them and if it is really profitable (Alliander project manager, 2019). Because the project was mostly for the developers to understand if the VPP is profitable, the residents were even compensated for their participation. In this sense, since the start, the community was not involved in the ownership of neither the hardware nor the software of the new energy system. For example, the batteries were owned

by the developers (13). The only RET that was owned by the residents were the solar panels.

Moreover, because the virtual power plant was connected to the national electricity grid, the grid was owned and managed by the DSO, Stedin. The control of the energy flow was also regulated by Stedin as the energy saved in the battery was directed to the energy company.

Lastly, Alliander project manager said: “if the energy supplier will make profit by having batteries available, they will be grated. However, in the project it was not the case because we couldn’t make profit so, there was no money” (Alliander project manager, 2019). This means that it would have been a share ownership, in particular shared revenue.

Conclusive remarks on ownership and control

	ENERGY MANAGEMENT SOFTWARE		RET		OWNERSHIP OF THE GRID		CONTROL OF THE ENERGY FLOW
LOENEN VIRTUAL POWER PLANT	CVPP	Community ownership	SOLAR PANELS	Private ownership	NATIONAL ELECTRICITY GRID	Owned and managed by the DSO	Controlled by the VPP which will be set by the inhabitants
			BATTERIES	Unknown			
SCHOONSCHIP	SMART METER	Unknown	SOLAR PANELS	Private ownership	MICROGRID	Community ownership	Collectively controlled by the community
			BATTERIES	Collective ownership	CABLE TO NATIONAL ELECTRICITY GRID	Community ownership	
HOOG DALEM 2.0	SMART METER	Stedin private ownership	SOLAR PANELS	Private ownership	NATIONAL ELECTRICITY GRID	Owned and managed by the DSO	Controlled by the people as the energy market is local
			BATTERIES	ABB private ownership			
CITY ZEN	SMART METER	Stedin private ownership	SOLAR PANELS	Private ownership	NATIONAL ELECTRICITY GRID	Owned and managed by the DSO	Controlled by the energy company
			BATTERIES	Alliander & Stedin private ownership			

Table 3. Ownership models

The above table (table 1) makes it possible to compare the different energy projects in terms of different ownership models. From the table, the similarities between Loenen Virtual Power Plant and Schoonschip are already

clear and their differences from the other two project, Hoog Dalem 2.0 and City Zen.

Concerning the ownership of the RET, it can be seen that Schoonschip and Loenen Virtual Power Plant share the same ownership model. In fact, both of them collectively own the renewable energy technology – the batteries in particular - through a foundation and in both cases as well, the exception from community ownership is for solar panels, owned individually by the residents. On the other hand, Hoog Dalem 2.0 and City Zen have an opposite ownership model, in the sense that the batteries are owned by the developers.

A possible reason for this result could be that in the first two cases, the residents are acting through a foundation that allows them to own the RET and the projects are community-led. For the last two projects instead, the residents are not organised through a cooperative or a foundation and the projects are developers-led projects.

With regards to the ownership of the grid, Schoonschip is the only one who owns collectively both the microgrid and the cable that connects the neighbourhood to the national electricity grid. The other three projects, all operate through the national electricity grid, which is owned and managed by the DSO under ownership unbundling as the Dutch law requires.
Finally, as for the control of the energy flow, Schoonschip again collectively control it, whereas in the other three projects it is some time controlled by the grid itself – the case of LVPP – by the residents through market dynamics – the case of Hoog Dalem – and by the energy company – the case of City Zen.

In conclusion, there are few settings of ownership models and control of the energy flow. The latter are different for each project and characterise the emergence of different energy democracies. Schoonschip has the far most community-oriented ownership as they all own the grid and they all control the energy flow. Moreover, it has the objective to create an alternative market where energy is not a commodity anymore but instead, a collective need. In this sense, Schoonschip is the most radical example of energy democracy among the other projects in terms of ownership and control.

However, as regards to the other three projects, there is still a difference between Loenen Virtual Power Plant and the other two, Hoog Dalem 2.0 and

City zen. In fact, Loenen Virtual Power Plant can be considered closer to Schoonschip as it shares the same community ownership model for the batteries.

Lastly, Hoog Dalem 2.0 and City Zen did not present any community element in terms of ownership and control.

3. 2 Project Sphere

The interpretation of the data related to the project sphere comprehends the analysis of two main elements, namely the modes of engagement in the decision-making process in the different projects and the role of the prosumer in daily operations of the project. The two elements are presented in this part of the chapter in the former order.

3.2.1 Modes of engagement in the decision-making process in the different projects

Schoonschip

Schoonschip is a "neighbourhood-led project" with a well organised structure of decision making. In fact, the residents of Schoonschip are organised through two main decisional structure: the owner's association (VvE) and the foundation (stichting). The first one is prescribed by the Dutch law whenever you own an apartment in the same building (in this case the same neighbourhood). All residents of Schoonschip are members as it is not possible to exclude yourself from the membership if you choose to live in the floating neighbourhood. The organisational structure takes decision on common issues that interests all the owners. There is a board which periodically organise a meeting to discuss or to decide on a particular situation. Each household has one vote and regular decisions require a majority consent.

The second structure of organisation, Schoonschip foundation, is different from the owner's association for two main reasons. The first one is that the

residents of the floating neighbourhood can decide not to become member of this organisation. The second reason is that the decision-making power belongs to the board for all decisions that involve less than 2000€ (1), whereas for the VvE all decisions are taken by all the households.

To support the decisions of these two organisational structures, there is a third body composed by several working groups, each of which is composed by different residents, such as energy group, mobility group, communication group, ect.. In particular, the energy working group holds the contact and deals with the energy company, Spectral (Ron, 2019). About this, Ron, one of Schoonschip resident involved in the Energy Working Group explained: "The working group looks at the paper, we discuss the issues with Spectral and then we advise our board 'we looked at the situation and this is what we think about it'. And then of course the board has to sign some papers" (Ron, 2019).

The whole organisational and decision-making structure of the "neighbourhood-led project" has two layers structure: an internal one and an external one. The first one is the internal decision-making, namely among the residents of the neighbourhood. This first layer presents both elements of consultation and deliberation. It is consultation because for regular decisions, namely the ones that involve less than 2000€, the residents only take part to decision making process by advising the board. Thus, although there is a dialogue between the board and the working groups, the board is the one that takes the decision (Ron, 2019). On the other hand, it is also characterised by deliberation processes as for major decisions, namely the ones that involve more than 2000€, everybody takes part in the discussion and deliberates by voting their preference (Ron, 2019).

The second layer is the external decision-making which sees the involvement of both Schoonschip neighbourhood and external stakeholders, such as Spectral and CWI – Centrum Wiskunde & Informatica. In this case, the procedure through which the neighbourhood is involved is deliberation. In fact, it is Schoonschip as a legal entity that commissioned both Spectral and CWI to develop the microgrid and it is still Schoonschip that is going to decide over the direction of the project (Ron, 2019).

As regard to the channels of consultation and deliberation, the residents are kept informed among themselves through weekly newsletters, WhatsApp group, and monthly meetings. Spectral and CWI were invited few times to those meeting (Ron, 2019), even though the energy working group has direct contact with them, through email, meetings and phone calls (Ron, 2019).

Loenen Virtual Power Plant

Loenen Virtual Power Plant is an INTERREG project that aims to establish a community-based virtual power plant (CVVP) in Loenen. The CVPP is bottom-up initiative in which houseowners, local energy companies and local companies co-create the virtual power plant on the base of the community willing. DPL - Stichting Duurzame Projecten Loenen - is the foundation that coordinates all the efforts.

Contrary to Schoonschip, Loenen Virtual Power Plant does not yet have a well-defined decision-making structure. Indeed, at the moment, the only decision body is DPL. However, as Qirion developer made clear: “DPL is just political structure” and she continued by saying: “DPL is not chosen by the people, they don’t represent the whole community” (Qirion developer, 2019). In fact, it is composed and represents the only few Loenen inhabitants that decided to participate to the project in the first place (Qirion developer, 2019). Therefore, as the whole community has to decide on the purpose and the management of the virtual power plant (Aart, Philip, Alliander supervisor, Qirion developer, 2019), in the near future, a new decision-making structure will need to be set up.

Like Schoonschip, Loenen Virtual Power Plant has two layers of decision making, an internal one and an external one. The internal decision-making structure which is the one that sees the collaboration of part of Loenen inhabitants and DPL, is still underdeveloped. It is now characterised by consultation mode of engagement, even though in the future it will be probably transformed in deliberation (Qirion developer, 2019). The external decision-making layer, which is the one that connects Loenen Virtual Power Plant to the local companies, is characterised by deliberation. Indeed, the DPL is the one who appointed Qirion and Translyse to develop the virtual power

plant and it is the one who is deciding how to proceed with the development of the virtual power plant at the moment.

With regards to the channels of consultation, Loenen inhabitants attended two information evenings. During these two evenings, they got to know the project in its technical and social terms, and they discussed the possible scopes of the virtual power plant. In fact, the evenings included a workshop, through which DPL could gather information on how Loenen inhabitants want to design the VPP to help them in their energy consumption (Aart, 2019). The two evenings were followed by individual surveys sent by email to understand how interested the inhabitants are and what they think it is important in the project (Aart, 2019).

As for deliberation, DPL and the two local companies that are developing the VPP are regularly meeting.

Hoog Dalem 2.0

Contrarily to the two previous projects, the residents involved in Hoog Dalem 2.0 do not have a proper organisational structure. However, the residents still participate in the dialogue with the developers and they still have a voice for certain decisions. About this, Pim, the spokesman of the residents said: "I can influence some details but not the major decisions. The major decisions are made by the energy companies because they spent money for the pilot, they made the plan, the timeline" (Pim, 2019). For these reasons, the mode of engagement in the decision-making process is consultation. In fact, they have a spokesman who participates to the stakeholders' meetings with all the partners every two months and informs them after the meetings.

Moreover, ABB and Stedin organise information evenings with the residents on a regular base (ABB developer, 2019). During these meetings, the developers update the residents on the developments of the project and through an interactive presentation, they ask the group their opinions on certain topics (Stedin developer, 2019). Lastly, it is a space for the residents to ask questions (Stedin developer, 2019).

Other channels of consultation are emails, Whatsapp group and phone calls (ABB developer, Stedin developer, Pim, Sander, 2019).

City Zen

For this project, the residents did not have any influence on the development of the virtual power plant, they were just kept informed through information evenings (Alliander project manager, 2019). Although the developers consulted the residents one time through a workshop to understand how the group would operate the virtual power plant (Alliander developer, 2019), the mode of engagement in the decision-making process was information provision. In fact, Alliander project manager confirmed: “we did do the workshop because we were eager to know what they think of it, but we didn’t have any room within the project to follow up on the results” (Alliander project manager, 2019). Moreover, the residents were not actively involved in the project and the flow of information was only one-way, developers to residents. The consequence of this mode of engagement was a dissatisfaction on the part of the residents (Alliander project manager, 2019).

At first, they were engaged but towards the end, their behaviour was disactivated by the developers who wanted them to follow their lead and to have no say on it (Alliander project manager, 2019).

Conclusive remarks on the project sphere

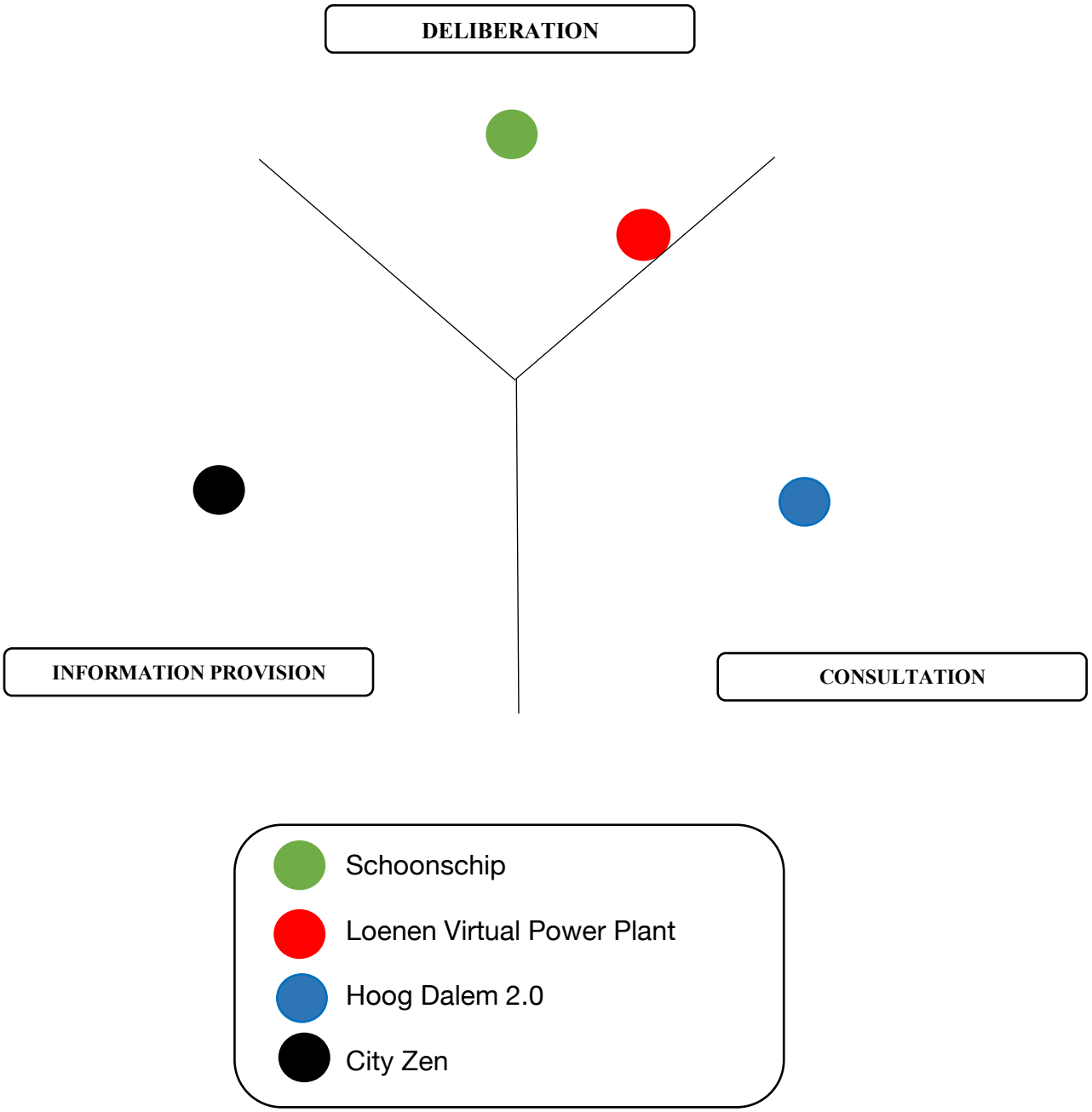

Figure 2. Mode of engagements in the decision-making process (Devine-Wright, 2012)

As shown by the figure above (figure 1), Schoonschip demonstrates the most democratic mode of engagement in the decision-making process, as deliberation is considered to be a means to overcome democracy deficit in renewable energy decisions (Bell, Gray, & Haggett, 2005). Indeed,

Schoonschip has the most organised decisional structure and its multiple layers prove to be both democratic and efficient. Moreover, the residents of the neighbourhood are in full charge of the project and Spectral, the energy infrastructure company, stands at Schoonschip's decisions. Similar to Schoonschip, in Loenen Virtual Power Plant, Loenen inhabitants are in charge of the development of the project. In fact, they are involved in the decision of the setting of the VPP and once it is set up, they will own and manage the VPP by themselves. However, as the project was proposed by few of those inhabitants, the other part of Loenen still need to be full involved in the decision-making process. In fact, as it is still relatively a new project, they are less organised in the decisional structure.

In contrast to the last two projects, Hoog Dalem 2.0 and City Zen have a different mode of engagement in the decision-making process. First of all, both of them, as opposed to the previous two, are not organised through a decision-making organism. They both have more an individual rather than a communal characterisation in the decision-making process. For example, in Hoog Dalem 2.0, each resident has a contract with both ABB and Stedin and this means that they can change it individually.

Moreover, neither of them is in charge of the project. Hoog Dalem residents only get consulted on some of the decisions and in City Zen, the residents have only got informed about the results of the demonstration project. Finally, it is indicative that in both these two last projects, the residents did not pay for the infrastructures (Hoog Dalem 2.0) and the residents were payed a contribution for their participation (City Zen). In fact, it can be assumed that the developers of the two projects had more the intention to test their technologies rather than to involve the community in a co-creational project.

3.2.2. Role of the participant in the projects

Schoonschip

Schoonschip residents are fully in control of the project. They can be considered energy producer because they are not only the owner of the grid, but they also operate the generation and distribution technology. It was their initiative to develop a way to become energy self-sufficient and energy neutral. Their involvement in the project is direct because of the energy working group and the constant communication between the residents and Spectral. Moreover, their relationship with Spectral is quite unique in the sense that the company was indispensable to the realisation of the project because of their expertise, but the residents still had the last word (Nina, 2019). In fact, for Schoonschip residents, the technicality of the projects remains complicated to understand (Gunnar, 2019). However, despite its difficulties, the co-creational approach was beneficial for both of them: "It is interesting to see the dynamics between the group who will use the system and largely who don't understand all the details and the technicality and a group like Spectral, it is for both side very useful. Because you know, they get to know how normal people deal with such technicalities. So they have somehow to step out of their technical and the other way around, we need to force ourselves to try to understand the technicality, because you can't do without a little bit of understanding of everything" (Gunnar, 2019).

Loenen Virtual Power Plant

As the project is community-led and wants to investigate how a virtual power plant can be managed by the people of the village, the participant has a big role in the project. In fact, according to Walker and Cass (2007) framework, the residents can be considered full-fledged project participants and, in the future, they will be energy producers. During the information evenings, the inhabitants of Loenen were very open towards the project and they express their willingness to participate (Philip, Alliander supervisor, 2019). The high endorsement was probably due to a successful previous experience with Loenen revolving fund, which is another project that is contributing to the general objective to reach energy neutrality and self-sufficiently in 2020. Moreover, both developers and residents agree that one

of the reasons why they are so open to the project is that they trust the foundation that proposed the project to them, LEN (Aart, Philip, Alliander supervisor, 2019).

Hoog Dalem 2.0

In Hoog Dalem 2.0, the role of the participant is seen differently among developers and residents. In fact, one of the developers says that there is high involvement in the project and the participants are quite enthusiastic. On the other hand, both of the two interviewed residents agree that their role of participants is quite small (Sander, Pim, 2019). Sander even stated that: "We talked about it and we decided to do a follow up project. But our input for the project is very low because it is a very technical, we only give our houses and the opportunity to gather data" (Sander, 2019). Looking at the future, he also adds that his role in the new local energy market will also be small, explaining that he would not stay behind his laptop to give input to the system to provide energy (Sander, 2019). On the contrary, the system should work automatically (Sander, 2019). Lastly, both residents mention that these kinds of projects are really technical and complicated, and they recognise that for people who do not work in the sector, it is difficult to understand it and thus, to be involved in it (Sander, Pim, 2019).
Given these results, Hoog Dalem residents can be seen as project supporters and service users according to Walker and Cass (2007) framework.

City Zen

As the participants did not have influence in the decision-making process and they were only kept informed about the results, they can be considered technology hosts and service users within Walker and Cass (2007) framework. In fact, Alliander project manager explained: "they don't have a role in determine what is the trading pattern will be or how the battery is used for it. because they are a really small part in a much bigger picture. They don't influence the trading patterns, they are just asked to be as normal as possible. It is a black box for them, but we try to make, and they could share the profit" (Alliander project manager, 2019). They did not have control on the scope of the project and their main task was to behave as normal as possible (Alliander

developer, 2019). The reason why the participants were not involved in the project is that City Zen was just a proof of concept, and the aim was limited to test a certain technology.

Conclusive remarks on the role of the participant

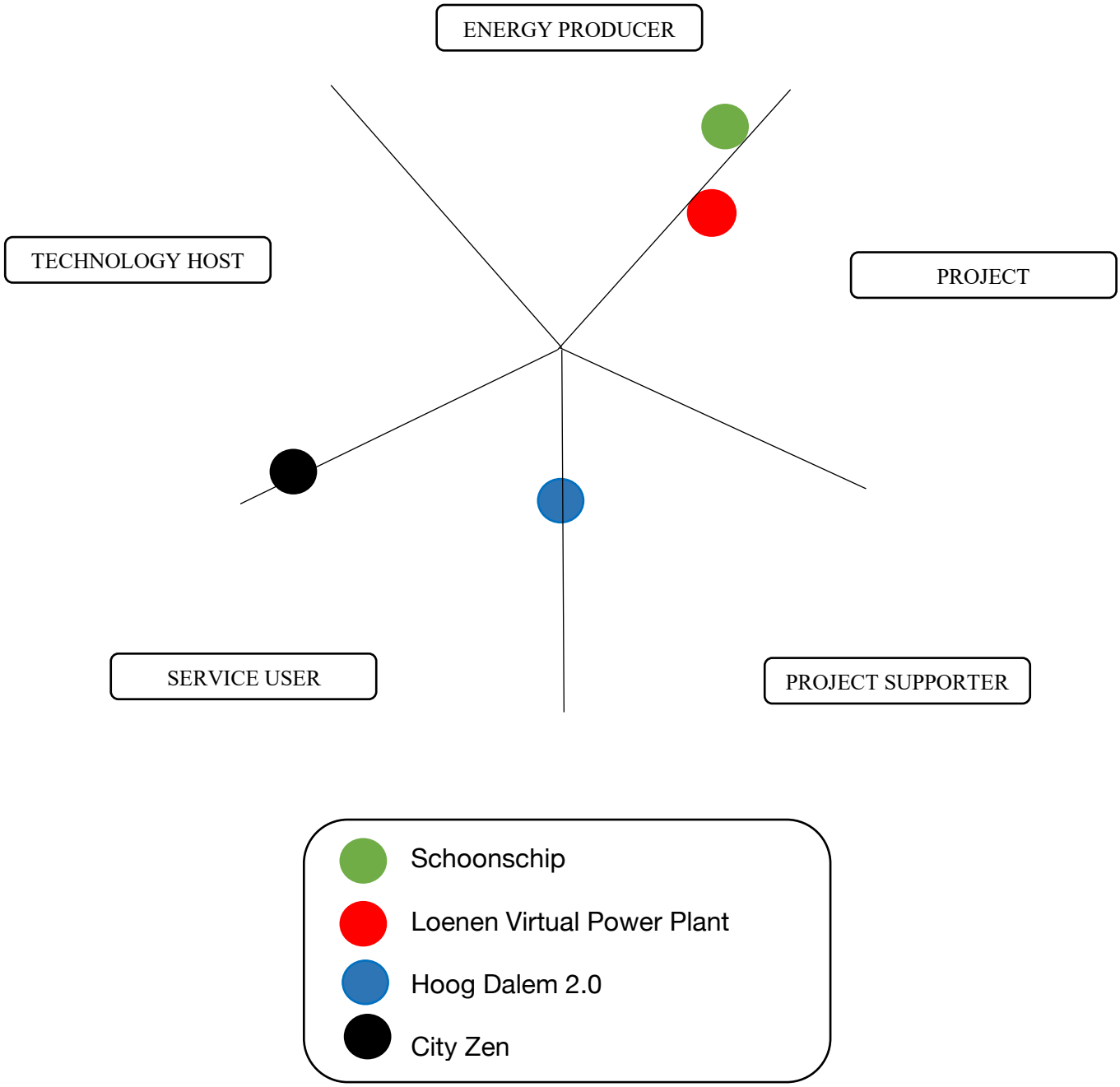

Figure 3. The role of the participant in renewable energy projects (Walker & Cass, 2007)

The above figure (figure 2) shows the role of the participants in the different projects. Because Schoonschip has almost finished to implement the new energy system, its residents are already energy producer, namely they own and operate the generation and distribution technology. On the same direction, Loenen Virtual Power Plant involves the inhabitants in different ways and most importantly, their involvement is fundamental to the success of the European project. Therefore, they are project participants and, in the future, they will probably be energy producers.

As for the other two projects, Hoog Dalem 2.0 and City Zen, they have a different role in the project compared to the previous two projects. In fact, in Hoog Dalem 2.0, the residents support the project, yet they do not participate in same way as Loenen inhabitants. In fact, Hoog Dalem 2.0 residents will not eventually own and neither manage the RET, but they are only supporting the developers in their idea of the creation of a local energy market. In the case of City Zen, the role is even smaller as they only had to host the technology. Their role was to just act in their consumer behaviours as normal as possible.

In conclusion, Schoonschip presents a well organised system for the decision-making process that allows the residents to participate and to be included in the decisions. Their self-organisation system allows for democratic engagement and thus, it can be included as an important element of an efficient energy democracy.

Loenen Virtual Power Plant as well, presents democratic engagement. However, even though the decision-making aims to include all the residents in the development of the project, the organisational structure is still underdeveloped. That is why, it cannot be totally compared to Schoonschip and for this element, energy democracy is less strong and radical compared to Schoonschip.

In Hoog Dalem 2.0, energy democracy assumes yet another shape. In fact, the project is more a pilot rather than a real implementation and therefore, it can be said that the developers have still one more word than the residents.

Nevertheless, the residents are being informed and they can decide over few things. This is why, it can still be talked of energy democracy.

In City Zen, the residents are just kept informed, and they are not involved in the project at all. Both the project sphere and the role of the participants seem to prove that there was no energy democracy.

4. Conceptualisation of energy democracy

This chapter focuses on the analysis of the data that allows to understand the conceptualisations around energy democracy. The first part presents the subject of energy democracy, namely the prosumer, explaining its different conceptualisations in the four projects. The second part of this chapter discusses the views on energy democracy among the different stakeholders.

4.1 Prosumerism

This section describes the results through three different lenses, namely technological conceptualisation – the prosumer as a subject whose role is functional to the implementation and enactment of the RET -, market conceptualisation – the prosumer as a new market subject either in a local energy market or in the bigger energy market -, and political conceptualisation – the prosumer as a subject who is to be empowered, who has new rights and responsibilities.

Schoonschip

When talking about the role of the prosumer in the project, Gunnar (2019), one of the resident of Schoonschip said: “It is a whole upcoming movement in the Netherlands, where more and more people start acting as a prosumer, and I think that the movement is very important in the energy transition. it is a very important movement when talking about energy transition” (Gunnar, 2019). Derek (2019), another resident, also encouraged people to engage and he said: “Everybody should join, then it works. It doesn’t work if we are the only one, that doesn’t make sense” (Derek, 2019).

When they were asked about the prosumers’ rights and duties, the residents were able to think about different ones. In their opinion, prosumers have the right to decide to sell their self-produced energy to third parts (Derek, 2019) and to decide over the infrastructure they want to use (Derek, 2019).

However, being a prosumer also comes with certain types of duties. For example, it comes with responsibility towards the others and towards the environment. On a smaller scale, Nina (2019), Schoonschip resident and treasurer in the foundation board, said: “If you don’t take care of the solar panel, other people are affected by it. because you have to keep it running. You are depending on the group” (Nina, 2019). In fact, the residents of Schoonschip depends on each other as their micro grid makes them interconnected. Along similar lines, Derek (2019) explained that in Schoonschip, you feel the urge to share what you produce and that helping each other becomes kind of a duty. On a larger scale, Ron (2019) believes that the prosumer has the duty to reach a point in which you use as little energy as possible, in a way that you can stop using fossil energy from the outside.

As the data show, Schoonschip has the strongest political vision on the prosumer compared to the other three projects. In fact, it presents element like empowerment, engagement, rights and responsibilities.

Loenen Virtual Power Plant

Loenen Virtual Power Plant turned out having a more technical vision and market vision compared to Schoonschip. When asked about the role the prosumer in the project, Philip (2019), one of Loenen residents and secretary of the DPL board, said that he will be more involved in the demand management side and that he is going to have a more passive role because he has few and very old solar panels . At the same question, one of the developers in Qirion (2019), the knowledge centre of the network company Allainder answered that the role of the prosumer will be different based on which type of RET they own. The first group will be formed by those who do not own solar panels and that for this reason, they are just going to be consumers that can monitor the production of Loenen energy and actively change the time of usage of the energy (Qirion developer, 2019). For the second group, everything will work as for the latter group with the exception that they own solar panels and they can turn off their solar panels at the top of the production to prevent the grid peak (Qirion developer, 2019). As for the third group, it will be formed by the ones owning the solar panels and some more devices

to steer, such as heat pumps, electric car and maybe electric boilers (Qirion developer, 2019). For the rest, they will have the characteristic of the two previous groups, as they will self-produce, change the time of usage of the energy and turn off the solar panels (Qirion developer, 2019).

Although these data show that the market and technical visions of the prosumer are in the foreground, Aart (2019), the project leader of LEN, thinks about the role of the prosumer through a more political lens. Indeed, he said: "If there were no awareness than people would say well why would I be interested? So yeah, they have to be aware" (Aart, 2019). He also added that right now the normal consumer does not see how its behaviour affect the network operator that will have extra costs (Aart, 2019). He continued by arguing that the prosumer is both aware of this problem and the key of its solution (Aart, 2019). Nevertheless, he pointed out that it should be a collective movement, that few people will not make the difference in the energy system (Aart, 2019).

The focus on market and technical conceptualisations rather than a political one also became apparent when the interviewees were asked to reflect on the prosumers' rights and duties. Philip (2019) said that in his opinion, prosumers have rights and duties and he went on complaining: "In my view, the prosumers now are spoiled, they have the soldering. That is a bit easy, you don't put electricity from the net and then throughout the year you are neutral. And that is fine, he gets the tax break which is generous, and the financial incentive is ok. But they just dump stuff in the grid, they cost me money. I don't have solar panels, they cost me money because the grid's expenses are higher. I am paying for the grid reinforcement" (Philip, 2019). Qirion developer (2019) also thinks that prosumers have different rights and duties. However, she is not clear in her answers and she linked it to a technical situation: "yes, I think it is necessary that all the production in the Netherlands have to be manageable. I know for Germany, it is possible for the grid operator to do something about the solar panels of the home owners. That is also a possibility. But maybe you also have to ensure good production of energy when it is not absolution" (Qirion developer, 2019).

Lastly, Alliander supervisor (2019) explained how Loenen community will have to manage the grid and the production of the energy and for this

reason, a different kind of rules will have to be set. With this affirmation, he hints to the fact that a duty could be to collaborate with each other and to find a way to collectively manage Loenen virtual power plant.

Hoog Dalem 2.0

In comparison to the other three projects. Hoog Dalem 2.0 has a stronger market vision on the role of the prosumer. Most likely, this is the case because the aim of the project is to set up a local energy market. In fact, both developers and residents mentioned the creation of a local energy market where prosumers would be able to trade energy among each other (ABB developer, Sander, 2019). ABB developer (2019) said that the prosumer is the key element of the project as they are the actors without whom the market would not be possible. On the same line, Sander (2019), one of the two interviewed residents explained that despite the fact they are not prosumers yet, they will eventually play an active role int the energy market, as a sunny windy day with a peak production can give them free energy to store in their batteries and then sell to the neighbours. On the other hand, when asked about whether he would want an active role in the energy system, Pim (2019), the other resident and spokesman answered: "Not really, because everybody has its own job and some people may be more active than others but most of the people are glad to give the money to the energy company that it has set upon the demand and they assure that this is the fair price. So, that is the facilitating role of the energy company and the rest in on the consumer itself. And some consumer can everyday check what is the price, but it is not for me. And I think the previous option will be the most chosen from people" (Pim, 2019).

However, he also mentions that he likes the fact that he produces the energy or buy the energy from the neighbours without a company who does not know him (Pim, 2019). Finally, he says that the three main reasons for the residents to join to the pilot project are community feeling, profit benefit and fighting climate change (Pim, 2019).

When asked about rights and duties of the prosumer, both the developers from ABB and Stedin agreed that being a prosumer should come with special care to the prosumers' privacy because their data collection is far more extensive than an average consumer (ABB developer, Stedin developer,

2019). They both did not mention any duty, apart from the fact that the residents should take care of the batteries installed during the pilot project (ABB developer). As for the residents, Sander (2019) thinks that one of its rights is to sell energy among each other without paying taxes and to play an active role in the energy market and Pim (2019) was indecisive whether he could say that producing energy is a duty, that maybe it is too far. From these answers, both residents and developers gave answers that confirm the more market orientated vision of the role of the prosumer.

City Zen

For this project, they were interviewed only two developers. It was not possible to interview the residents because Alliander did not have the possibility to contact them and share the contact information. The two interviews then, show a market conceptualisation of the prosumer. Alliander developer (2019), the one that has a closer look to the technical developments explained what changes from being a consumer to be a prosumer: "What changes with the possibility that you can now trade, you can be metered on your house on a quarter base, it makes it possible to trade in a group in a smaller perspective and it enables smaller groups to be part of the energy market" (Alliander developer, 2019). However, City Zen, contrary to Hoog Dalem 2.0, did not experiment a local energy market. Instead, the residents were selling energy to the national market.

Alliander project manager (2019), mentioned the fact that the prosumer did not have any role in the project as they were meant to just participate and act as normal consumer. This answer coheres with the answers given by Alliander developer when asked about rights and duties of the prosumer. In fact, he said: "There's a right to choose their own way, how to produce or buy energy. They have their right to choose their own energy supplier, they have their right to choose how they want to store their energy, how they want to use the grid. Consumer's right in that sense" (Alliander developer, 2019).

Conclusive remarks on the three prosumer's conceptualisations

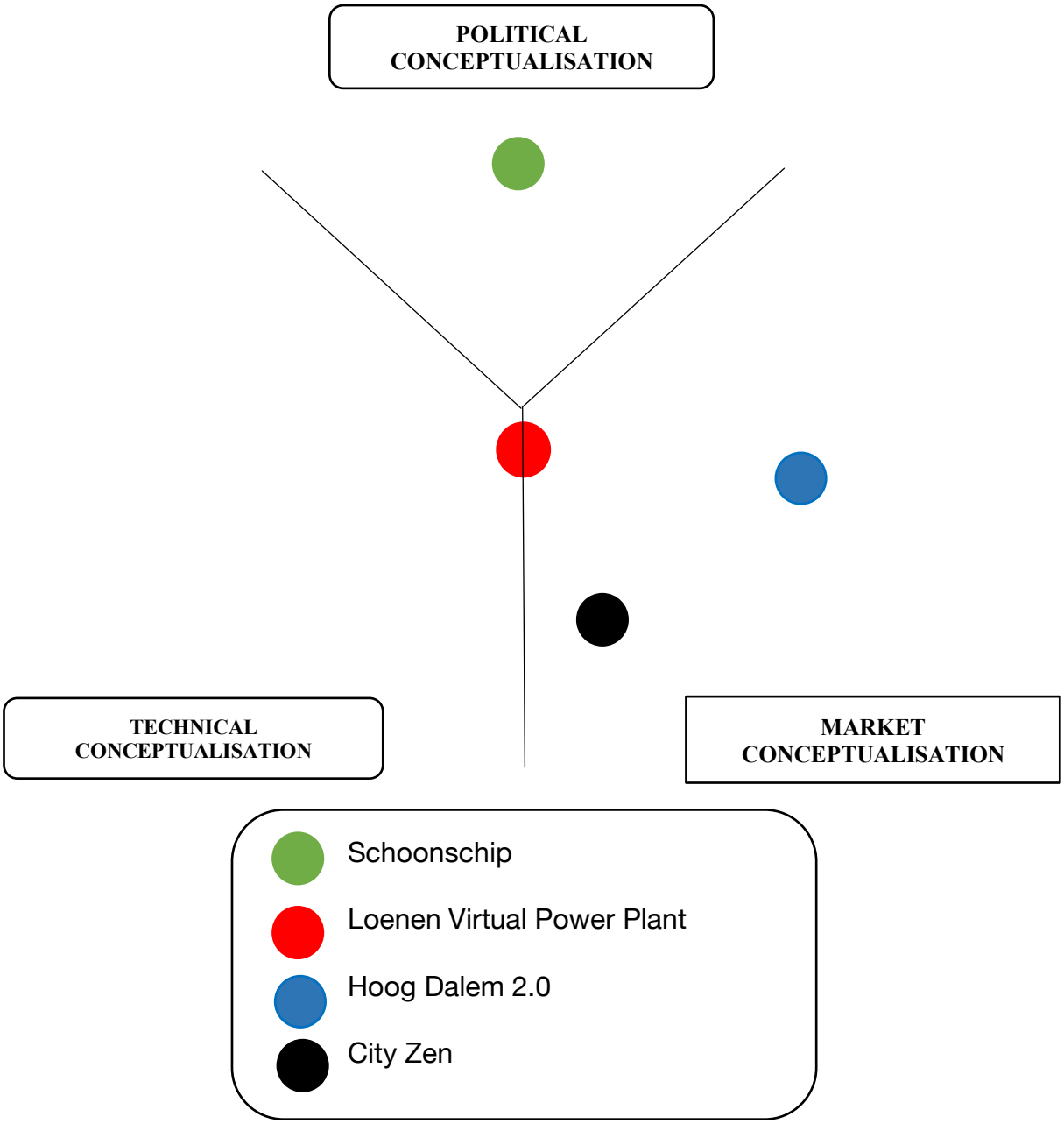

Figure 4. The role of the prosumer

The figure above (figure 3) shows how the four energy projects differ in the prosumer's conceptualisation. As already stated in the previous paragraph, Schoonschip showed the strongest political conceptualisation. This could be explained because the interviewees were chosen among the

residents. In fact, it was not possible to interview developers from Spectral, as they did not have time for the interview. For this reason, most likely, the project did not reveal a technical conceptualisation because the only interviewees did not have a strong technical background in the electricity sector, and they were not interested in it. However, even though this element might have contributed to the more general political view on the role of the prosumer, it can be said that Schoonschip residents are still the residents with the most political vision on their role compared to the residents of the other projects.

As regard to market conceptualisation of the role of the prosumer, Hoog Dalem 2.0 was the project that has the most market orientation as its aim is to create a local energy market. This could be the reason why both the developers and the residents see the prosumer as a new player in the energy market. The same goes for City Zen that has also a market vision of the prosumer. Nevertheless, City Zen is different from Hoog Dalem 2.0 as they set up two different market. In fact, if Hoog Dalem 2.0 allows the residents to trade energy among themselves, City Zen residents participate to the traditional market, as the energy in the batteries is sold to the energy company.

Loenen Virtual Power Plant demonstrated a mixed conceptualisation. In fact, although a market and technical vision on the role of the prosumer was predominant, in particular one of the interviewees also had more political role image of the prosumer.

In conclusion, it seems that the aim of each project shapes the conceptualisation of the role of the prosumer. In fact, Schoonschip with a more political vision, was born as a neighbourhood project to inspire others to do the same. The type of energy democracy conveyed could be named as “activist energy democracy”, to emphasise that the residents are engaged in the project and that they have a broader mission.

Hoog Dalem 2.0 has a market vision because it aims to develop a new local energy market. This energy democracy is then focused on the market rules with an attention to the fairness of those new rules. This energy democracy can be called “marketized energy democracy”.

Loenen Virtual Power Plant has mixed vision as its aim is both to develop a virtual power plant and to make Loenen inhabitants the owners and managers of the energy management system and devices. Therefore, the highlight of this energy democracy in both the visions of the residents and the developers, is community choice and thus, it can be called "community's energy democracy".

Finally, City Zen, with a market technical conceptualisation, had the aim to investigate whether to predict consumer's patterns and steer batteries is profitable. The goal was never to create and foster energy democracy.

4.2 Energy Democracy

Energy democracy is still quite a new concept and it is opened to different interpretations, especially considering the different role of the stakeholders in energy projects. By analysing the answers of both residents and developers, the data show four different recurrent themes: organisation of the energy system, decentralisation of the energy system, fairness of the energy system, and the right to choose. This second part of the chapter analyses the four themes in the former order.

Organisation of the energy system

Organisation of the energy system is one of the socio-economical aspect that few of the residents and developers identified while envisioning energy democracy. As intended by the interviewees, the organisation of the energy system refers to the organisation of production and usage of energy. Aart (2019), Loenen residents and project manager of Loenen Energie Neutraal (LEN) said that energy democracy is "the possibility to influence both production and usage of electricity" (Aart, 2019) and he adds that "choice is important, to choose how you want to use energy and how you want to produce it" (Aart, 2019). On a similar page, Gunnar (2019), one of Schoonschip residents thinks at energy democracy as the possibility of both individuals and groups to define for themselves how they want to solve their energy needs. In both these two definitions, influence and choice are active

mode to achieve energy democracy. In fact, as Aart (2019) recognises, there is no democracy in the current energy system. The reason is that the consumer is just at the end of the line, and he only has to pay the electricity bill every month (Aart, 2019). Thus, in the current energy system, he has neither influence nor choice.

Ron (2019), another Schoonschip resident introduced another element to these interpretations, which is the way individuals and groups can influence and make choices. In fact, he says that energy democracy means to be able to decide in a democratic way how to organise their own energy system (Ron, 2019). In City Zen as well, Alliander project manager (2019) mentioned that energy democracy is the way people decide themselves how to build the virtual power plant.

Attention was also given to the challenges that the reorganisation of the energy system brings. Philip stated that "a big challenge in the energy transition is not technology, not the institutions, it is the people. The challenge is how to get to a common ground, how people should organise, mobilise, because there are so many different interests and perspectives, either rational or irrational" (Philip, 2019). He was not the only one who sees people at the centre of the discussion. In fact, Derek from Schoonschip thinks as well that "you need a lot of regulation by the government, but the government is chosen by the people. It comes back to us. If we choose *dutch politician*, everything will be burnt to get as much as energy as possible in a cheap way, instead of making a big change" (Derek, 2019).

Decentralisation of the energy system

Another socio-economical element that was mentioned during the interviews is the decentralisation of the energy system. Ron said: "the energy system has to be more decentralized; we have to get rid of this huge central power utility like the coal power station, nuclear power station, gas power station. We have to move to a more individual energy usage, like on a smaller scale as much as possible, where people are involved and yeah, that you can tell your children where your energy comes from" (Ron, 2019). As in Schoonschip, Aart (2019) from Loenen also agreed that autonomy is an important element, that people do not want to be any more dependent on

energy companies. There is a need to unknowledge where the energy comes from, to be in charge of the system. Philip (2019) as well considers energy democracy as being self-sufficient, kind of an autarkic system, even though it needs to be both collective and at the local level. Alliander supervisor from Loenen (2019) also believes that a local energy community is the key. He thinks that the current energy market is not optimal, as people are paying for thicker cables because of solar farms (Alliander supervisor, 2019). Instead, he thinks that people should own their own energy, not the energy produced by those solar farms (Alliander supervisor, 2019).

In these interpretations, there is a red thread that is the willingness to get involve in the energy system and to really understand where the energy comes from, to see beyond the electrical socket. However, sometimes, it is also a matter of trust, or distrust: "Somebody once said, it's either a sha or a sheik. So, shiek from the Middle East, or a sha from Persia. I mean, it is very abstract and political, but people do understand that we are dependent in that sense.

And that is not a good feeling. We had already been sometimes collectively taken hostage by the oil crises, and I remember that was nasty. They didn't want to give us any oil anymore or sell us any oil anymore, and it put a lot of stress in the system. So, if you do it by yourself, with your own means, you are fully in control" (Aart, 2019).

Fairness of the energy system

One last element that was mentioned by Hoog Dalem residents and Stedin project manager is the fairness of the system. In fact, the two residents see our current energy system as being unfair for similar reasons. Sander (2019) thinks that everybody should have equal rights and benefits, that everybody should be able to join the local energy market and have benefit from it, not only the people who understand the system. On the other hand, Pim (2019) believes that it is not a question of understanding the system, rather it is a question of who will profit from the local energy market: "it is a fair system or not, that is the question. People spending money on solar panels and batteries are making more profit than people who do not have the money for it. That is not fair. It is only fair when everybody can afford it but it is not economy" (Pim, 2019).

Lastly, Stedin project manager (2019) also touches the topic of fairness of the energy system as he sees energy democracy as a system where everybody is allowed to join, with or without PV or other infrastructures.

The right to choose

This fourth conceptualisation of energy democracy comes from the developers' side. In fact, they think about energy democracy as a way for the partecipant to decide over the technologies' designing principles, on the base of their wants and needs. It is then a more technical perspective of energy democracy. For example, ABB developer said: "Now the discussion is focusing on the technical solutions, and the digitalisation and even the social innovation are two topic we need to have more focus on. So, we need to start with the people, what they really need and want, then we will find for sure a technical solution that will fit with their needs. So, then you start to fulfil the demand with the technical solutions. In five years, in a person life time you will switch, some time you will need more comfort, or maybe you want to focus more on the energy saving. So not only energy demand and supply, but also to deliver based on the demand, the expectation of the people. Social innovation is one of the most important thing for the energy transition" (ABB developer, 2019).

Talking about the need to develop technological solutions that fit the needs of the people, Alliander project manager (2019) thinks as well that the energy technology should be created on what the people want to maximise, for example to profit from it or to be greener.

On the other hand, Qirion developer (2019) said that she has a technical perspective, that is why she had never thought it as an issue. She also argued that people should get to decide some details (Qirion developer, 2019).

Conclusive remarks on the four themes

Throughout these data, it is possible to draw some first conclusions. It can be noticed that both developers and residents think about energy democracy as either in organisational, decentralisation or fairness terms. The fourth interpretation instead, seems to belong to the developers.

Concerning the first three themes, it can be noticed that each of them characterises one of the project: Schoonschip has a particular attention to the organisational structure of the energy system; Loenen Virtual Power Plant focuses more on decentralisation as autonomy is an important element in the project; in Hoog Dalem 2.0, the general belief is that the energy system needs to be fair for everyone: and in City Zen, the vision on energy democracy is more technical and technology based. Even though each of these perceptions fits more to one of the four projects, in general, it can be said that each of this vision are present in all of the project.

Moreover, in general, it can also be noticed that the residents had more political visions on energy democracy. On the other hand, the developers had more a technical approach in answering the question about energy democracy. The reason behind these different interpretations could be that the expertise of the developers allows them to talk about technology and make the nexus with democracy.

5. Discussion

This chapter explores new understandings and insights in light of the findings. First of all, it discusses the conceptual framework in light of the results that has previously been analysed. In the second part, it shows the limitation of the findings by reflecting upon the possible and eventual biases.

5.1. New insights

The results previously reported allows to raise questions upon the conceptual framework and help to understand not only its limitation but also its potential.

Concerning the practice of energy democracies, the ownership structure of both the RET and the grid of the renewable energy projects are diverse within the projects. In particular, the projects cannot be considered fully privatised or fully communal. Instead, they are characterised by degrees of ownership and control. In this sense, they can be seen through the notion of "bundle of rights", the metaphor that John Commons used for the first time to describe property not as a single absolute right but instead, as a collection of different types of rights (Commons, 1893). Wolsink (2013) already suggested that within a socio-technical system such as microgrid or smartgrid, different kinds of property are present, and that formal ownership does not give a complete picture. Rights that could fall under this new bundle are: the right to decide how to make use of the energy you produce, the right to control the RET, the right to participate actively to the project, the right to decide over the setting and the development of the energy management software.

Moreover, as this research analyses ownership as an important element to understand energy democracies, the notion "bundle of rights" could give the opportunity to investigate the complexity of socio-technical relations, in particular between the private energy companies and the residents of the neighbourhoods in which the projects are set up. In fact, by analysing this

new bundle of rights, it would be possible to draw a first outlook of the relationships among the stakeholders involved by considering that different rights might come with different degrees and shades.

The research studied the role of the participant in the project through Walker and Cass (2007) framework. Even though the framework gave a useful base to analyse the data, the results showed the emergence of new roles within smartgrid and microgrid projects that could not be included in the framework. For example, nowadays, the role of "energy producer" is too restricted. In fact, approximately every resident participating in microgrid and smartgrid projects is energy producer, but he aspires to become something more, namely prosumers. In this sense, the role of the participant is changing by microgrid and smartgrid projects bringing up new roles and responsibilities. This new figure that is being introduced, can be analysed in relation to the technology and to the market. In relation to the technology, the prosumer is in charge of the devices installed in his house, usually through an app that connects the user to the RET. As for the relationship with the market, in case of the creation of a local energy market, the resident becomes not only energy producer but also energy supplier who is no longer the user at the end of the cable. Instead, he is becoming a negotiator that can decide to discuss the terms of the relationship with the energy company by shifting it from being a one-way relationship to be a two-way relationship. In microgrid and smartgrid project, the resident becomes more aware about what is "behind the plug" and he can set the conditions over the control and the management of the energy he produces. This role of negotiator can be different depending on the project and the way the residents want to shape it. For example, in Schoonschip, where the microgrid can be disconnected from the national one, the residents decided to have a residual relationship with the energy company as they do not need it to make the grid works and the energy flows. On the other hand, in Loenen Virtual Power Plant, even though the residents will decide over the setting of the VPP and its management, they will still count on the DSO to operate the national electricity grid. In this sense, compared to the past, the residents can decide over different aspects of their energy spheres: they can decide to be prosumer at all effects, to only consume what

other prosumers produce in a local energy market, to be more or less dependent from the energy company, to rely on an automatic energy management system or to actively change the setting of the parameter. In conclusion, the prosumers have something they did not have before: choice and therefore, power of negotiation.

The establishment of the new role of negotiator has also repercussion on the discussion on the role of the prosumer. In fact, the results have shown that the discussion on prosumerism has not only market and technical connotations, but also political ones. In particular, unlike the developers of the projects that have a more technical and market perspectives, the residents usually have a more political one.

At the European policy level as well, even though empowerment of the consumer is mentioned, the starting point on the discussion has a more market-oriented perspective rather than a political one. This is probably due to the fact that prosumerism has inevitably technical and market consequences to consider on the current energy system, as the prosumer is becoming a new influencing energy market figure. However, in this way, the political perspective could remain underdeveloped with the risk of distancing the citizens from the topic by making the discussion too technical. Therefore, the political perspective should also be taken into account as a way to involve the citizens in the discussion.

Finally, as the new role of negotiator is arising and people are starting to get more informed and involved, the discussion on prosumerism should be brought to the level where even who know less about the energy system can understand what it is all about and actively decide to participate to this transition.

Concerning to the vision on energy democracy, the findings clearly showed that there is no universal definition of energy democracy. On the contrary, more definitions are possible and that is why, one could speak of energy democracies. In particular, this goes to validate the argument given in the conceptual framework on the presence of different conceptualisations of democracy. From the data retrieved, it can be noticed that broad elements of

different democracies such as self-governance, deliberation in decision-making process, empowerment of non-states actors and concern of access to and engagement with resources, are represented in the context of energy democracy in microgrid and smart grid projects. In particular, these last elements seem to be followed by the four different visions on energy democracy found by interviewing both the residents and the developers. In this sense, the organisational structure and decentralisation's vision seems to trace the elements of self-governance and empowerment of non-states actors, the vision on the fairness of the energy system follows more the element of concern of access and engagement with resources, and deliberation in decision-making process.

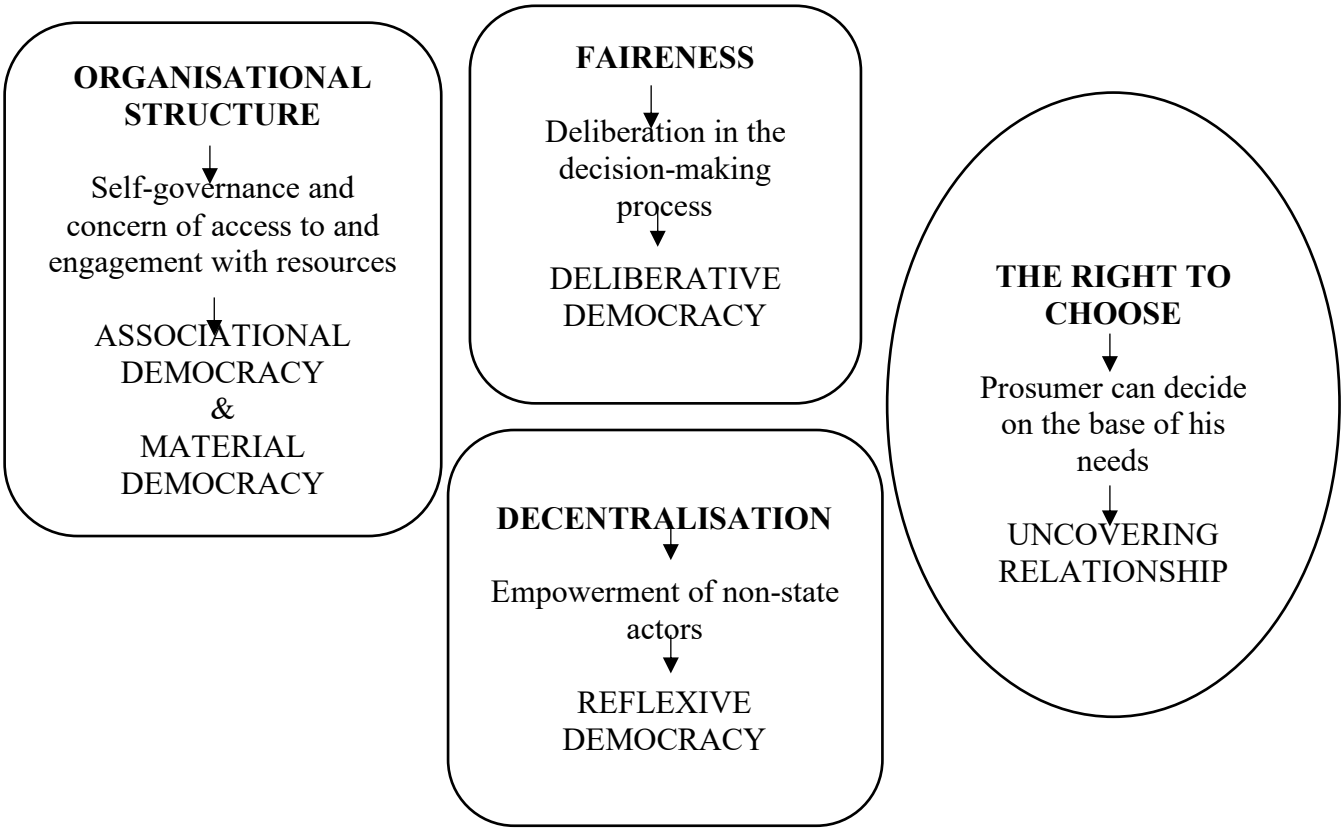

Figure 5. The elements of the energy democracies

The figure above explains the different energy democracies that have emerged by interviewing both the residents and the developers on the practice and the visions of energy democracy. However, the data had also shown that, from the developers' side, there is one more element to add to the equation of energy democracy in microgrid and smartgrid projects. This element, namely the right to choose does not belong to one single definition of democracy. Instead, it can be added to each of these types of democracy as an additional element that can help uncovering the complex relationship between the two main stakeholders, the residents and the developers. In fact, this element means that the prosumer has now the possibility to decide how to participate on the base of his needs and whether to participate in an active or passive way. In this sense then, compared to the current energy system, the prosumer can decide which kind of relationship he wants to establish with the technology and thus, with its developer.

Therefore, because this element is centred on the needs and willing of the residents, it is interesting to study it, in order to understand which role plays in the emergence of those energy democracies and in the long term, in the transition towards a new energy system.

In Schoonschip, through "the right to choose" element, it is possible to say that the relationship between the residents and the developers is two way folded, where the residents are the ones who commissioned the project and they are the ones who decide on its setting and development. Regarding Loenen Virtual Power Plant, "the right to choose" element suggested that the relationship between DPL and Qirion does not directly involve the residents and that the discussion is less inclusive than one might think when first gets to know the project. As for Hoog Dalem 2.0, "the right to choose" element also gave an understanding of the relationship between residents and developers. In fact, the project has more a technical characteristic and the residents are mainly involved as subjects of a pilot project. The residents have individual contracts and they are not made aware about their role of prosumer.

However, they can choose whether to be active or passive prosumer by deciding few designing principles. Lastly, in City Zen, the residents did not have the right to decide over the development of the project, and therefore,

"the right to choose" element can explain the outcome by understanding the only technical purpose of the project.

5.2. Limitations on the findings

This part of the discussion analyses the limitations of this study by discussing the generalisation of the findings and its biases.

Generalisation, or "external validity", is the application of the findings to other populations and settings than the sample of the study (Ritchie & Lewis, 2003). In this research, generalisation is not strong as the findings cannot be applied to other settings and populations. In fact, the research has been conducted in the Netherlands and, as the country has specific national regulations on the topic of energy transition, the findings cannot be generalised to other countries. As for the population, it is also context related and it cannot be generalised. Therefore, even though microgrid and smartgrid projects can be similar across country and population because of the used of a specific technology, specific regulations of the country and cultural elements of the population lower the generalisation of this research.

Another limitation on the findings is the language barrier and the inexperience in conducting interviews. First of all, when I had to ask questions about the ownership, I felt shy and did not really know how to ask for contracts and private documents. This pitfall has influenced the findings on the ownership part as it could have been more detailed and thus, give more contribute to the final findings. Secondly, during the first interviews I was insecure because I knew little about the current Dutch energy system. However, the more I went one, the more I understood, and the more I was able to ask precise questions that helped me in the development of my findings.

During the interviews, the regulatory framework was often mentioned as either enabler or barrier to energy democracy. Even though this element was an important one to consider in studying energy democracy in microgrid and

smartgrid projects, due to the limit of time for a master thesis, it has not been explored in detail. A detailed framework of the energy regulations both national and international, could have helped for a future comparison between microgrid and smartgrid projects in another country.

Lastly, because of the limited amount of time, I could not interview more stakeholders participating to microgrid and smartgrid projects. It would have been interesting to interview people from the municipality as they can play an important role as facilitator or withholder.

Conclusion

This chapter summaries the findings while answering to the two main research questions about both the practice and the vision on energy democracy. By interviewing both the residents and the developers of four different microgrid and smartgrid projects, this research aimed to both study how different energy democracies take shape and how they are understood in the context of those projects.

The first part of the chapter will focus on answering to the first research question. In the second part, the chapter will resolve the second research question. Finally, it will discuss the possible future of energy democracy.

How are different energy democracies developing in practice in microgrid and smartgrid projects?

From the findings, it appears that the four projects are characterised by different energy democracies. Schoonschip presents the most radical one as for all the three elements of ownership, engagement in the decision-making process and role of the prosumer, it presents strong democratic stance. Its radicalism comes both from the fact that the residents actively chose to participate to the project and that they have forward-looking propositions such as the one to create an alternative local market with cryptocurrency. Moreover, the residents of this neighbourhood have a strong political vision on prosumerism and they represent the conscious fragment in the whole movement.

Loenen Virtual Power Plant is similar to Schoonschip even though the characterisation of energy democracy is less radical. On one hand, the project is much oriented on the access to and engagement with the energy and it aims to empower Loenen inhabitants in order to decentralise the city's energy system. On the other hand, compared to Schoonschip, they do not own the

grid and the energy management system, they are less self-organised, and they are still at the information level concerning their role in the project. However, as the project is still in its first phases, there will be probably future development that will bring it closer to Schoonschip's energy democracy.

In Hoog Dalem 2.0, the energy democracy, which is emerged, is in practice a weak one. In fact, the project is much concerned with the access and engagement with the resource, but it has lower attention to few other elements, such as the empowerment of non-state actors, self-governance and deliberation in the decision-making process. In terms of ownership, both hardware and software are owned by the developers. As for the modes of engagement, the residents are involved in some of the decisions even though they have not much influence on what will happen. Concerning the role of the participant in the project, the residents will eventually become prosumers in a local energy market, and they will get decide whether to take an active or passive role in the new energy system.

Finally, City Zen did not present any of the elements that characterise in practice energy democracy and, therefore, it cannot be talked as a project that stimulate the emergence of any type of energy democracy. The project has never been created with the intention of involving the residents where it took place. Instead, it was a proof of concept to understand the possible future economic benefit of the technology installed. Therefore, it can be said that City Zen is an example of smartgrid project that did not lead to any energy democracies.

In conclusion, Schoonschip presents a pro innovation energy democracy, in Loenen Virtual Power energy democracy emerged in such a way that inclusion of the Loenen inhabitants is the most important element and in Hoog Dalem 2.0, a local market energy democracy is emerging.

How are different energy democracies emerging in the visions of the project stakeholders in microgrid and smartgrid projects?

The concept of energy democracy appears in the visions of both the residents and the developers. The findings show the recurrence of four themes, namely the organisation of the energy system, the decentralisation of the energy system, the fairness of the energy system and the right to choose.

It should be noticed that the first three themes are all present in the literature and they all occur throughout both the residents and the developers. This could be a hint of the fact that the emergence of an energy democracy discourse is transversal, and it involves everyone. The fourth element – the right to choose –, instead, was only mentioned by the developers as it refers to the decision of designing principles of a particular technology. This element is an interesting one as it can have an impact on the definition of the relationship between the main project's stakeholders.

It can be said that the emphasis on one of the four visions can shape a different energy democracy. The case studies helped to understand in which way these themes are distributed among microgrid and smartgrid projects. In Schoonschip, a particular attention goes to the organisational structure of the energy system and its efficiency in the organisation. This characterisation probably comes from the fact that the residents are particularly involved and politically active in the scene of energy transition. For this reason, this type of energy democracy has been called "activist energy democracy".

As regards to Loenen Virtual Power Plant, the project focuses more on decentralisation as autonomy is an important element in the project. The emphasis on this element is also proven by the fact that Loenen inhabitants will be the owners and managers of the energy management system and the devices. Because of this characterisation, this energy democracy has been called "community's energy democracy".

In Hoog Dalem 2.0, the general belief is that the energy system needs to be fair for everyone and this fairness needs to be developed in a new local energy market where the prosumer is the new economic subject. In this

regard, this energy democracy has been called “marketized energy democracy”.

Finally, in City Zen, the vision on energy democracy is more technical and technology based. However, the project was never conceived to create energy democracy and thus, it cannot represent it.

One last observation is that, even though each of these perceptions fits more to one of the four projects, in general, it can be said that each of these visions, in different measures, are present in all of the projects.

On the future of energy democracy

The future on energy democracy can be quite challenging but, if we want, it is full of opportunities. Understanding the importance of this historical moment is fundamental to create a sustainable and just energy system. We have the opportunity to involve the citizens into the discussion, by making them the main characters. We can create a system in which people know where their energy comes from. Together with new technology innovations like microgrid and smartgird, we have the chance to turn upside down the way we deal with energy: from receiving a bill from an energy company, to actively decide what to do with your own energy.

However, in order to create this new energy system, it is important to consider all types of side effects that new innovations can bring in an old rooted system.

An example could be the effect of microgrid and smartgrid projects on the people who are not involved, as these new technologies may also hide less democratic effects. These types of project could be useful to prevent energy poverty, as demand and supply of energy are under control and there is less risk to adjust the network by building thicker cables. This would be the case only if everyone would install these types of technology. Nevertheless, this is not yet the case as these projects are not the rule but only the “exemption”. In this sense, only few people will be able to afford the project in order to

maintain the same grid. This situation could lead both to the creation of a green elite and to an increase of price in energy for those who cannot participate to these projects. For them, the price will eventually rise, equally for everyone, because of the adjustments at the grid level. This would lead to energy poverty and thus, to an opposite outcome compared to energy democracy. In this scenario, only few will be lucky to create a local energy market that allows them not to upgrade the grid. The rest of the people will have to bear the costs, increasing the unfairness of the current system.

Nevertheless, there is a solution. This scenario brings to light another important element: regulations. In fact, to avoid the previous situation, new regulations that take into account this side effects should be established. Not only to provide the system with a safety net, but also to facilitate energy democracy's advancement.

In conclusion, the future of energy democracy will depend only on us.

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Pim (2019). Phone interview.

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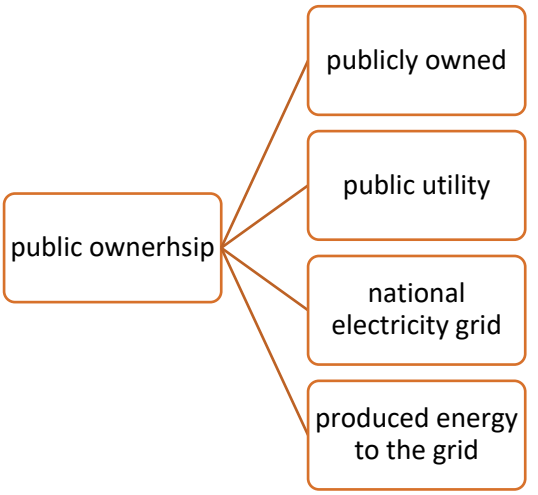
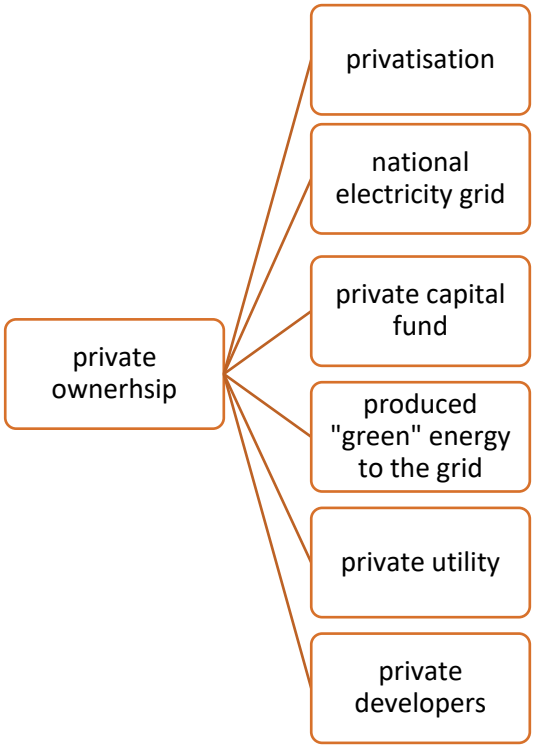
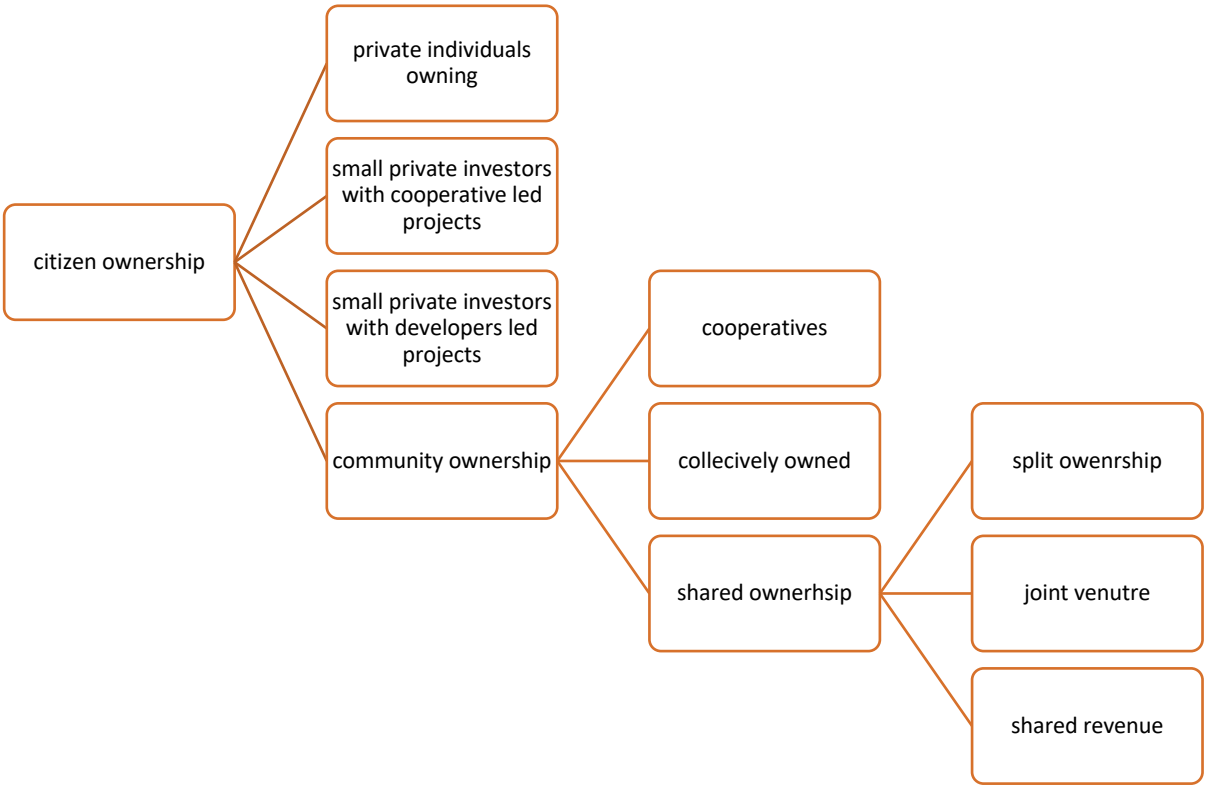
APPENDIX A.

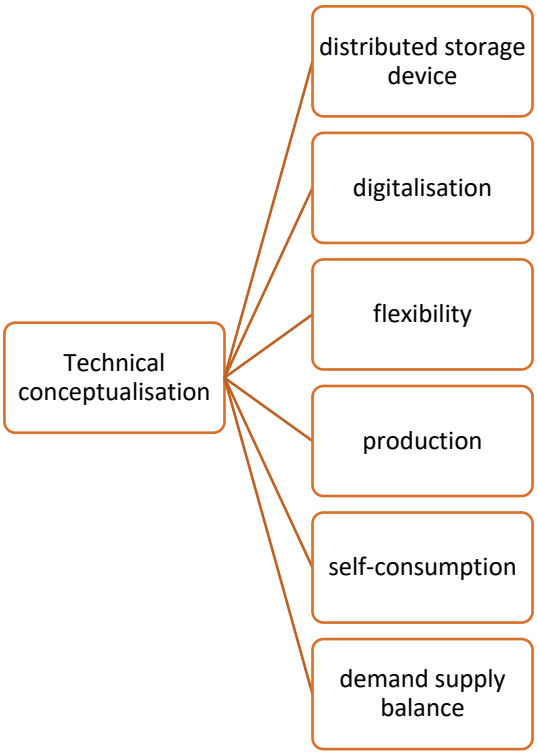
Ownership coding schemes

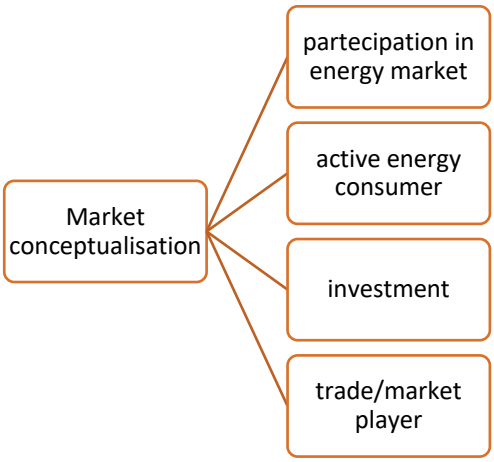


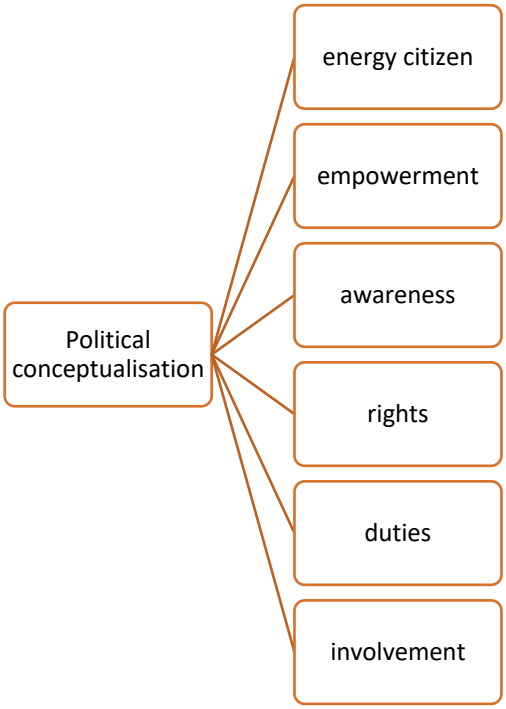



citizen ownership
private individuals owning
small private investors with cooperative led projects
small private investors with developers led projects
community ownership
cooperatives
collecively owned
shared ownerhsip
split owenrship
joint venutre
shared revenue

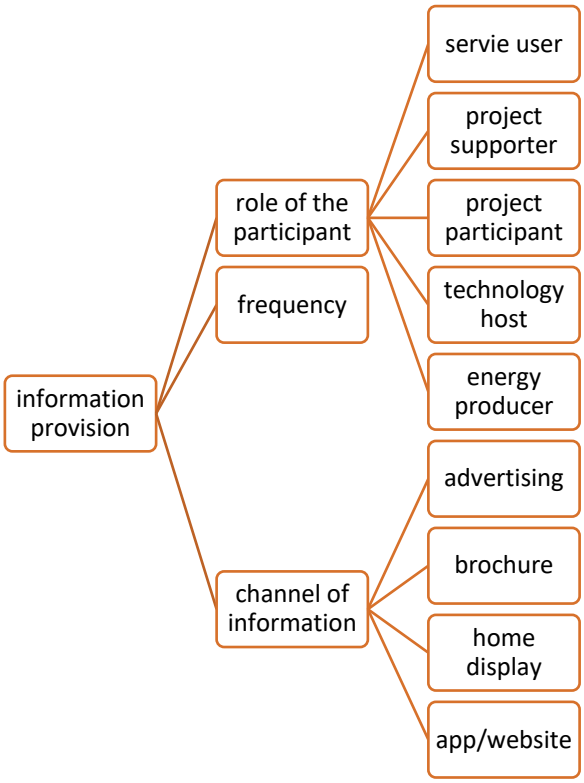
Prosumerism coding schemes

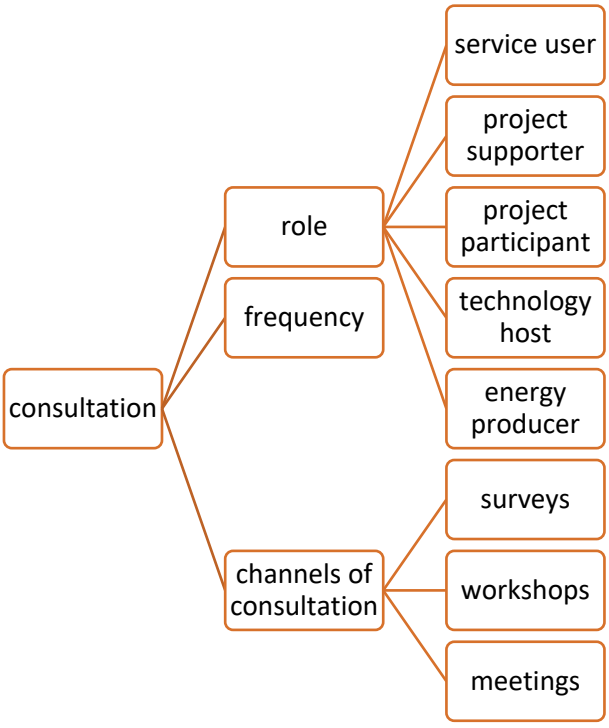


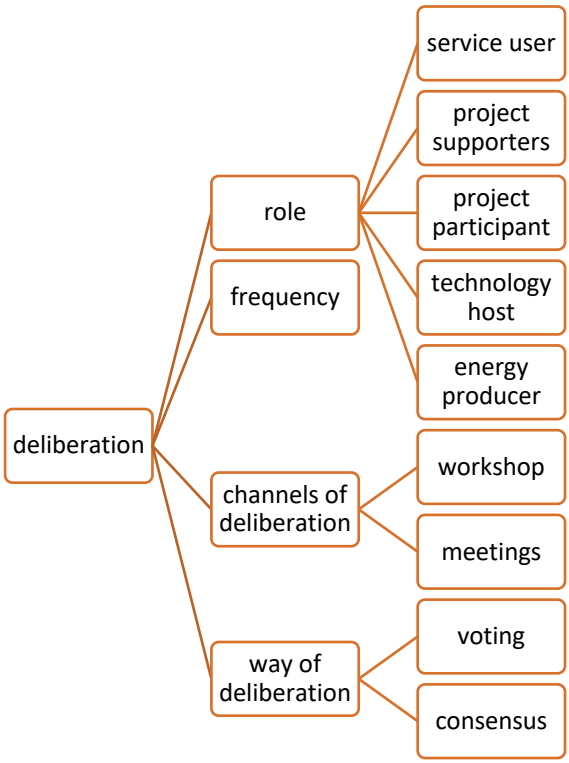



Political conceptualisation
energy citizen
empowerment
awareness
rights
duties
involvement

Project sphere coding schemes






deliberation
role
frequency
channels of deliberation
way of deliberation
service user
project supporters
project participant
technology host
energy producer
workshop
meetings
voting
consensus

Energy democracy coding scheme