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Socio-Ecological Innovations in the Context of the German „Energiewende“

An Analysis of Benefits and Necessities in the Urban Arena

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Vorwort

Frau Wiesholzer hat in ihrer Masterarbeit „Socio-Ecological Innovations in the Context of the German Energiewende“, die sie an der Hochschule für nachhaltige Entwicklung Eberswalde verfasst hat, sozio-ökologische Innovationen anhand mehrerer Beispiele analysiert. Dabei hat sich die Autorin in der Themenwahl einem Bereich zugewendet, der bei Kommunen und Landkreisen derzeit einen hohen Stellenwert einnimmt. Die Arbeit konzentriert sich auf die Fragestellung, wie die Energiewende durch sozial-ökologische Innovationen befördert werden kann und wurde vom Wuppertal Institut mitbetreut.

Im Rahmen der deutschen Energiewende fungieren alternative Strom Initiativen als sozio-ökologische Innovationen, die wesentlich zur nachhaltigen Entwicklung von Städten beitragen, damit einen besonderen sozialen Nutzen ausüben und einen entsprechenden Wert für den Transformationsprozess haben. Bislang wurde diesem Aspekt der in Nischen entwickelten sozio-ökologische Innovationen weder in der kommunalen Praxis noch in der Wissenschaft genug Beachtung geschenkt. Das Thema und die von Frau Wiesholzer erarbeiteten Ergebnisse sind daher für Wissenschaft und Praxis gleichermaßen von hoher Relevanz.

Die Arbeit zeichnet sich sowohl im Aufbau als auch in der Gliederung durch eine sehr gute und übersichtliche Vorgehensweise aus. Der thematische Zusammenhang der einzelnen Teile, Kapitel und Abschnitte ist sehr stringent, die thematische Gliederung der Arbeit wurde von der Autorin in sehr guter Qualität vorgenommen. Die Autorin hat ihre formulierten arbeitsleitenden Fragestellungen vortrefflich auf der Basis von fundierten theoretischen und grundlegenden Betrachtungen dargestellt. Dabei spiegeln die in der Arbeit behandelten Fragen und verwendeten Begrifflichkeiten den derzeitigen Wissens- und Diskussionsstand sehr gut wider. Die verwendete Literatur zeigt, dass sich die Autorin intensiv und sorgfältig mit dem relevanten Schrifttum in Wissenschaft und Praxis beschäftigt hat.

Die Arbeit von Frau Frau Wiesholzer zeichnet sich durch eine hohe Qualität der konzeptionellen Vorschläge, Aussagen und eigene Transferleistungen aus. Zudem hat sie ihre Empfehlungen grafisch anschaulich zusammengefasst. Die Autorin erreicht aufgrund ihrer Herangehensweise eine exzellente problemspezifische Bearbeitung. Die von ihr durchgeführten Interviews mit VertreterInnen der ausgewählten Fallbeispiele zeichnen sich durch eine sehr gute Konzeption und Auswertung aus.

Eine umfassende Definition und Einordnung des Problems in den Gesamtzusammenhang führen in das Thema ein und bereiten die weiteren Teile der Arbeit ausgezeichnet vor. Es gelingt Frau Wiesholzer eine klare Darstellung des Problems sowie ausgezeichnete Analysen vorzunehmen und darauf aufbauend Empfehlungen zu entwickeln. Das in der Masterarbeit von Frau Wiesholzer zugrunde gelegte Forschungsdesign zeichnet sich durch klare Fragestellungen und ein gründliches Literaturstudium aus. Die Arbeit ist in englischer Sprache verfasst und ermöglicht dadurch einer internationalen Leserschaft die Möglichkeit, mehr über die Potenziale sozio-ökologischer Innovationen im Rahmen der Deutschen Energiewende zu erfahren.

Wuppertal, im November 2018

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"In the endeavor to defend the contemporary, today's ideas are being defined as utopia while yesterday's solutions are being fixed."

(Canzler & Knie, 2017, p. 96, translated from German into English by the author)

Acknowledgements

At the beginning of this thesis I would like to thank some people without whom this paper would have not been possible. Naturally first, this accounts for Prof. Piorr for initial guidance and help with getting overview of my thoughts. Also, of course, Mr. Oliver Wagner who provided me with the opportunity to contribute to the project 'Wirtschaftsförderung 4.0'[1] (economic development 4.0) of the Wuppertal Institute. I would also like to thank Werner Wiartalla from the 'ufaFabrik', David Baltzer from the 'Leuchtturm eG' and Thomas Richter as well as Vassilious Efthimiou from the 'Berliner Stadtwerke' for their readiness to participate as case studies and share their experiences. Special thanks shall moreover be forwarded to Rolf Novy-Huy, Prof. Heike Walk, Dr. Martin Peters, Timo Kaphengst, Jens Homann, Thomas Dohmen, Sandra Kelm who deliberately took their time to share their expertise and ideas with me. Eventually, I would like to thank Annalena Lohaus and Stephanie Petzold for help with transcription, as well as Dilfuza Yuldasheva, Merrit Munck and Marie-Kathrin Siemer for their valuable outer perspective and editing.

[1] see https://wupperinst.org/p/wi/p/s/pd/643/

Summary

Alternative power initiatives are socio-ecological innovations that substantially contribute to city's sustainable development and, therefore, are of particular societal benefit and value. Cities should, consequently, have an inherent interest in their existence and proliferation. This, however, asks for strategic innovation management. While, acknowledgement of the project's innovativeness constitutes the precondition for management, in the further process of steering activity the tasks to reduce hurdles, create open space and support the project's capacities need to be mastered. Thereby, cities are increasingly asked to become innovative themselves in order to find ways to optimally make use of their available tools and capacities.

Zusammenfassung

Alternative Strom Initiativen sind sozio-ökologische Innovationen, die wesentlich zur nachhaltigen Entwicklung von Städten beitragen und damit einen besonderen sozialen Nutzen ausüben und Wert haben. Es ist daher im Sinne der Städte selbst deren Existenz und Verbreitung zu fördern. Das bedarf jedoch strategischem Innovationsmanagement. Während die Anerkennung des Innovationspotentials der Alternativprojekte die unabdingbare Voraussetzung für entsprechendes Management darstellt, ist die Aufgabe im weiteren Verlauf des Steuerungshandelns Hürden zu reduzieren, Freiraum zu schaffen und die Kapazitäten und Fähigkeiten der Projekte zu erhöhen. Dabei müssen die Städte zunehmend selbst innovativ werden und Wege finden, ihre verfügbaren Werkzeuge und Rollen optimal einzusetzen.

Index

I. Introduction

Planet earth is in transition, as the world society is being confronted with a magnitude of ecological[2] and social[3] challenges and even crises that demand a substantial alteration of functions and logics of all societal subsystems. The so called 'great transformation'[4] requires a sustainable conversion of the energy, economic and financial, mobility and transport, as well as the land-use – agriculture, forestry – sectors. Thereby cities and other municipal actors increasingly find themselves in the spotlight, as, on the one hand, they are often directly affected by the socio-ecological problems, but on the other hand, are more and more being perceived as change agents with a high potential to positively influence and design the transition. This, for instance, is being expressed by the international 'New Urban Agenda', which denominates cities as central climate protagonists (Habitat III Secretariat, 2017), but also by the 'Sustainable Development Goals' (SDGs) that highlight the role of cities by providing them with their own development goal – namely goal eleven which has the vision of cities that are "inclusive, safe, resilient and sustainable" (United Nations, n.d.).

In Germany the ever more central and active role of cities is getting particularly prevalent in the field of the energy transition (Berlo & Wagner, 2015; Boehnigk, 2016; Statz, 2017; Vogel, 2013). "The municipal level is of crucial importance for the material implementation of the energy transition, as the potentials for the expansion of renewables, of energy efficiency on the demand side and for the expansion of decentral cogeneration [as well as sector coupling] are always feasible locally in the communities." (Berlo & Wagner, 2015, p. 234 translated from German into English by the author)[5] In this context, the urban players are increasingly asked to come up with innovative solutions for how to optimally balance local generation and demand, while intelligently linking the energy sector with its other areas of activity – like housing, social care, and many more. A complex challenge to which no easy answers can be given. However, in the development of innovative solutions, cities are not being left alone (Berlo & Wagner, 2015).

Since its beginning, the German energy transition has been accompanied by "a magnitude of projects eager to realize energy transition 'aside of market and state'" (Berlo & Wagner, 2015, p. 237*; see also Mulgan, 2006), which – by finding and living alternative ways of energy production, transmission and consumption – in their own way contribute to a successful energy transition. Thereby, their solutions often go much further than only applying cleaner technology. Rather, the use of alternative sources of energy

[2] The so called planetary boundaries (Rockström, J. et al., 2009) in general and climate change in particular.
[3] Migration, population growth, armed conflicts, terrorism, financial crises, digitalization and its implications on the future of work, urbanization, …
[4] see WGBU (2011)
[5] As the context of this paper is situated in the German context, several sources are originally in German language. Translations are, therefore, not avoidable and shall subsequently be indicated with an * behind the indication of page.

is being embedded in novel social and economic settings. It can, therefore, be assumed that aside from their efforts in climate protection these kinds of energy projects also bring about other socio-ecological contributions from which overall city development could benefit. Nevertheless, the socio-ecological innovation potential of such initiatives has so far often been overlooked (Loske & Vogel, 2017; Rave, 2016; Rückert-John, Jaeger-Erben, & Schäfer, 2014; Seyfang & Haxeltine, 2012; Seyfang & Smith, 2007; Zahrnt, Stoll, & Seitz, 2017) and, thus, systematic municipal support strategies are missing.

This thesis aims at filling this research gap by finding answers to the following questions: What kind of alternative power initiatives have developed in the course of the German energy transition and what are their socio-ecological benefits to municipalities? Special focus shall, thereby, be lain on urban municipalities. Cities, first, need to be aware of the potentials that rest within the alternative projects, before the question of how the urban players could strategically foster this kind of projects can be approached.

In order to be able to answer these questions, the theoretical framework of innovation research shall be applied. From the theoretical framework dimensions can be derived that first help to detect alternative energy initiatives, by framing them as innovations, and second provides insight on their magnitude of socio-ecological benefits for cities. Moreover, innovation research provides a concept that can be applied to develop strategic municipal support strategies that helps cities to strengthen alternative energy initiatives – the innovation management approach. Methodologically speaking, the paper is based on literature research and interviews. Also, the case study approach is being applied in order to ground-truth theoretically derived insights. Accordingly, the paper is structured in a rather theoretical and an empirical part. After a more detailed elaboration on the methods applied in this paper (chapter II.), the theoretical part (chapter III.) starts with an introduction into the historical development of general innovation research, to gain a first overview of the theory (chapter III.1.). In a next step, the innovation concept is being elaborated upon more detailedly in order to build a sound basis and common understanding for analysis (chapter III.2), before the innovation management approach is introduced (III.3). Then, it shall be clarified why cities are chosen to be perceived as innovation managers in this thesis and whether this is in line with innovation theory (chapter III.4). Eventually, the theoretical part closes with the identification of alternative power initiatives, by framing them with the innovation approach (chapter III. 5). The empirical part (chapter IV.) starts with the depiction of three case study projects (chapters IV.1.-3.) that are situated in Berlin and tested according to their actual innovation potential and socio-ecological contributions to Berlin's city development so that a better understanding of the before rather abstractly outlined hypotheses can be gained. In chapter IV.5 the innovation management approach is being applied to the city of Berlin in

order to identify loopholes and derive city-specific recommendations. Eventually, theory and practice are brought together by summarizing the results of the paper (chapter IV.4. and 6.). Then, potential shortcomings shall be discussed (chapter V.), before the thesis completes with a conclusion (chapter VI.).

II. Method

This paper is structured in a rather theoretical (chapter III.) and an empirical part (chapter IV.). Methodologically, it is mainly based on a broad literature review and qualitative interviews.

In the theoretical part, not only an overview of the applied framework of innovation research in general and innovation management in particular shall be gained, but also a clearer understanding of what is meant by alternative power initiatives and in which way they can be regarded as innovations. Research interest is, thereby, vastly satisfied by an extensive literature research, which constitutes the main applied tool during this phase. Books, papers, journal and newspaper articles, reports and also online information were used as sources in order to progress in research. Information on innovation theory, thereby, mainly builds on the work of Schumpeter 'The Theory of Economic Development' (1980, originally from 1912), who is regarded being the founder of innovation research, but is complemented by more current papers – primary and secondary literature – in order to get a broader and up-dated picture of the innovation concept and its applications in science. From innovation theory dimensions are being derived that help the identification of alternative energy initiatives and their benefits (see Hauschildt, Salomo, Schultz, & Kock, 2016). In this context, another work is of fundamental importance namely the UN Habitat's 'New Urban Agenda' (2017). It is being regarded as providing the most current information on a cities' overall target system and, hence, constitutes the basis for testing initiatives according to their socio-ecological contributions. Insights into innovation management, in turn, mainly build on the handbook 'Innovationsmangement' by Disselkamp (2012) that provides a framework for testing management activity, so that at the end strategic recommendations can be given. Information derived by the desktop study is further completed by statements and ideas that were provided in the expert interviews.

In the rather empirical part of the paper, the dimensions and hypotheses developed in the theoretical part are tested and ground-truthed by applying the research strategy of case study analyses. Case studies provide the researcher and reader with an in-depth understanding of a certain case in its specific setting. Thereby, complexity can be reduced and abstract findings concretized, as a more general phenomenon is demonstrated by elaborating on exemplary cases. This is the reason, why the case study approach was chosen to be appropriate for approaching the research questions of this paper, too. As the number of existing initiatives is very high and the urban contexts vary substantially, elaboration on something

like an ideal case does not seem to be constructive. Hence, it was chosen to look at exemplary cases to gain a more realistic understanding of the innovation potential and the benefits of alternative power projects and to derive city-specific recommendations for innovation management. It shall be noted here, that generalizability is not the main aim of the case study in this paper as the conditions and needs of the initiatives as well as of cities themselves are projected to be too different. Still, it will be expected that some general results can be derived.

The cases to be looked at in this paper are alternative power projects. Thereby, alternative means that their ideas of how to generate, transmit or consume power substantially differ from conventional solutions. Hence, the projects can be located alongside the power value-chain, ranging from the production, via the transmission and distribution, to the consumption side. The challenge thereby is, that clear information on case study boundaries can only be given after a more detailed description of triggered changes in the German power landscape (see chapter III.). Only then, the elaborated dimensions of innovation can be applied to detect potential power initiatives (see chapter III.2). After having gained overview of potential alternative power initiatives, three exemplary cases in Berlin were searched for and looked at in more detail. Thus, the multiple case study strategy was chosen, as looking at one single case would not fit the research purpose of this study. Learning from more cases makes sure that a more general understanding of the projects' benefits and needs can be derived. However, due to limited time and scope of the paper a more extensive analysis of further cases was not feasible but should be considered as task for further research. The case study context of Berlin was chosen due to its geographical closeness to the author's research institution and as – due to its size but also its fame for being a very creative environment – it was expected to house a broader selection of potential projects than Eberswalde. When selecting the cases it was ensured that different kinds of alternative power projects – which are further located at different ends of the power value chain – are represented. The projects were identified via applying the purposive selection technique snow-ball sampling. Thereby, the author's already existing awareness of some projects – which was for instance triggered by having attended at conferences[6], where respective alternative initiatives were mentioned – was completed by desktop research and hints given by the interviewed experts and other contacts[7]. An overview of the snow-ball sampling process is provided in the annex. At the end three projects could be convinced to participate as case studies in this paper.

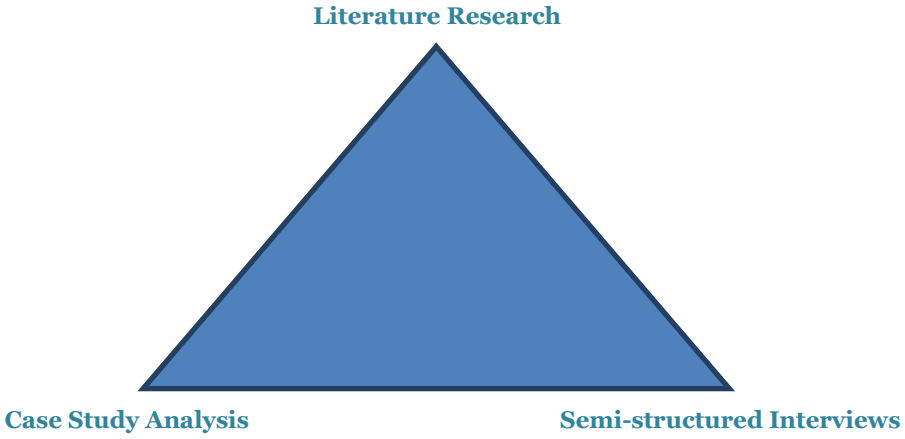
[6] Master Class Course Conference Renewable Energies, 2016, HNEE and Beuth Hochschule, Berlin; Verantwortung: Können – Machen – Zeigen. Kleinstunternehmen und Handwerk auf Nachhaltigkeitskurs, 2017, HWK, Berlin; Regionalwert AG Berlin-Brandenburg, 2018, Eberswalde; Baustelle Energiewende. Strom, Wärme und Verkehr ökologisch modernisieren!, 2016, Heinrich Böll Stiftung, Berlin.

[7] such as the supervisor of this paper, professors of the author's research institution, colleagues and others.

Information for analyzing the case study projects was then derived by conducting semi-structured face-to-face interviews. The semi-structured approach was chosen to provide the interviewer with a certain degree of flexibility. By this means, it was possible to dive in deeper into brought up and so far undetected thoughts but also to skip certain questions so that redundant answers could be avoided and, hence, interview time spent more efficiently. Still, in the forehand interview guidelines (see annex) were worked out to provide for certain orientation. The innovation dimensions as well as the levels and phases of innovation management – which are delineated in the theoretical part – constituted the overall guideline. At the end, eight interviews[8] were conducted that each lasted about one to one and a half hours: One with each case study project – whereby in one case the interview was conducted with two representatives simultaneously – and five additional ones with people that were regarded being experts on the field.[9] In order to identify potential experts, yet again purposive selection was applied. An overview of the sampling process is provided in the annex, as well as an overview of the conducted interviews, their dates and additional information. Access to the interview situation is ensured as they were recorded and transcribed and can be provided on request. The interviews were analyzed using color-coding. However, a sensible and fast allocations of information were achieved by composing the questions according to the dimensions of analysis.

Hence, the methodological approach of this paper consists of the following research triangle:

Figure 1: Methodological triangle



Source: own illustration

By setting the approach on three pillars, it shall warrant that, despite focusing on qualitative methods, the outcomes can be regarded as objective and sound.

[8] Due to time constraint the number of interviews needed to be limited to that amount.
[9] Due to the geographical context interviews were conducted in German. Hence, when quoting, statements needed to be translated from German into English by the author. In the text this shall be indicted with an *.

III. Theoretical Part

1. Introduction into Innovation Research

Innovation is a popular term which is used in many different areas and situations, not to say inflationary (Interview 6). Still, until now it is mostly being referred to, first, in the context of research and development (R&D) and, second, business development. This strong allocation in the economic field is due to the fact that innovation theory has its roots in economic theory.

The beginning of innovation research can be traced back to the early 20th century. With his publication of 'The theory of economic development', Joseph Schumpeter (1980, originally from 1912) introduced the term innovation into economic sciences. According to Schumpeter, enterprises often find themselves in a circular flow of economy that leads to a stable but static situation. Assuming that companies thrive for economic growth and development[10], Schumpeter further highlights the need for companies to be innovative (Schumpeter, 1980). In the Schumpetarian understanding "[i]nnovation may be defined as a change in existing production system to be introduced by the entrepreneur with a view to make profits and reduce costs" (Suman, n.d.)(see also Mulgan, 2006). Innovation results from a new combination of knowledge and resources and can take a variety of forms: a new product, a new production method, a new market, a new source of supply, or a new form of organization of an industry (Suman, n.d.). Although, the range of innovation results is already quite diverse, in the classical Schumpetarian understanding it rather accounts for business actors, market conditions and technical products and processes – so called 'technical innovations' (Schumpeter, 1980) (see also Bauknecht, Brohmann, Grießhammer, Bach, & Funke, 2015; Mulgan, 2006; Rave, 2016).

Since the second half of the 20th century, and especially since the leading paradigm of technological development as panacea has been questioned, this has increasingly been target of criticism (see Zapf, 1989). On the one hand, critics argued that the above mentioned rather technical focus of innovation research was too narrow, ignoring other potential areas where innovation could emerge. On the other hand, awareness was rising that technical innovations were embedded within the societal context and, thus, their chances of successful diffusion strongly depended on social factors (Grießhammer & Brohmann, 2015).[11] Eventually, criticism resulted in the introduction of a social dimension to the classically economic research field but also to a widening of the innovation concept itself, which has opened up new pathways for innovation research (Zapf, 1989).

[10] "He defined development as a 'Spontaneous and discontinuous change in the channels of flow, disturbance of equilibrium which forever alters and displaces the equilibrium state previously existing'." (Suman, n.d.)

[11] This is also when the idea had spread that "[a]ll innovation is social innovation" (Grießhammer & Brohmann, 2015, p. 19, cited as of Urry, 2011).

Ever since, research on technical innovation has been complemented by elaborations on other forms of innovation, such as social, socio-ecological, grassroots, political or institutional innovations (Grießhammer & Brohmann, 2015; Rave, 2016; Seyfang & Haxeltine, 2012; Seyfang & Smith, 2007). Of all the above mentioned terms, social innovation is the broadest one, as it both constitutes the umbrella term for non-technical innovation categories (Rave, 2016) but is also considered as a sub-category on its own.

> "Social innovation refers to innovative activities and services that are motivated by the goal of meeting a social need and that are predominantly diffused through organizations whose primary purposes are social." (Mulgan, 2006, p. 146)

Social innovations, thereby, seek to find solutions to social challenges, while technical innovation was rather detected to originate from the desire to maximize profit (Mulgan, 2006). Therefore, both the innovation results as well as the range of actors are very diverse (Rave, 2016; Rückert-John et al., 2014).

Since the beginning of this millennium, due to the development of the new research branch of sustainability and transformation research, innovation research has found another field of application and the term sustainability innovation or socio-ecological innovation was coined (Interview 3). The sustainability transformation is a great challenge that requires "[r]adical improvements in production and consumption systems" (Seyfang & Smith, 2007, p. 587) and, hence, new technologies but also cultural and societal change (Seyfang & Smith, 2007; Singer-Brodowski, Hasselkuß, Bliesner-Steckmann, & Baedecker, 2014). This results in an increasing need for the development of innovative alternatives in all societal sub-systems but, even more, cross-cutting solutions (Interview 3). With his multi-level perspective,[12] Geels eventually provided a theoretical framework, in which innovations play a central role. He divides systems in the three levels 'landscape', 'regime' and 'niches' and further concludes that innovation mainly occurs in niches[13], which – if successful – can ultimately alter or even replace the regime (Geels, 2002, 2005)(see also Bauknecht et al., 2015; Grießhammer & Brohmann, 2015; Seyfang & Smith, 2007). Also, the energy transition is such a transformation and sustainable development process in which new and alternative ideas and projects emerge. Consequently, alternative power initiatives shall be looked at from the perspective of innovation research in this paper.

[12] The multi-level perspective is an approach which is used to analyze, describe and manage transition processes (Bauknecht et al., 2015).

[13] Niches are "'protected spaces' [...] in which technical, market, social or regulatory innovations can develop" (Grießhammer & Brohmann, 2015, p. 9*) freely. Hence, niche actors can experiment without selection pressure, which in contrast would be exerted on the regime-level, and can therefore develop radical alternatives to the existing regime structures.

2. Innovation and Innovativeness

To proceed further it is vital to define the term 'innovation'. As has just been carved out, innovation research is rooted in economic theory but has entered different research areas over time. Consequently, today the term is used widely and innovation is being analyzed in many different ways, which sometimes makes it hard to keep overview.[14]

In general terms, one can say that innovation is something novel.[15] Here, novel means more than new. It implies a fundamental and profound change. Novelty can result from a new combination of purpose and means (Hauschildt et al., 2016), or knowledge and resources, respectively (Arentsen & Bellekom, 2014; Rave, 2016; Schumpeter, 1980).

According to Hauschildt et al., „[i]nnovations are qualitatively new products or processes that substantially [...] differ from the status quo" (Hauschildt et al., 2016, p. 4*). Still, this definition stays rather abstract, due to two elements: First, it is unclear what 'substantial' means. Second, the relativity of 'innovation' implies that innovativeness can only be approached in comparison to the 'old' or 'conventional' equivalent. However, in an attempt to make the term innovation more tangible, Hauschildt et al. (2016) provide six dimensions:

- The first dimension asks **'What is novel?'** and thereby lays the focus on the content of the innovation. Novelty of a certain solution can, however, yet again only be detected in demarcation of already existing solutions. Different kinds of innovation can result in diverse innovation subjects. While in the narrow understanding of innovation as technical innovation, innovativeness usually results in new products or (production) processes, social innovations can create a much broader range of outcomes. Just to give some examples, the innovation process could generate new procedures, institutions, rules, regulations, life styles, organizational structures, production and consumption patterns, and much more (Hauschildt et al., 2016; Rave, 2016; Rückert-John et al., 2014).
- The next question to be answered is: **How novel is the innovation?** This dimension asks for the degree of innovativeness, hence whether it constitutes a radical or rather incremental alteration of the so far known (Hauschildt et al., 2016). Radical innovations, for instance, cannot consist of gradual changes but of an intentional renunciation of the so-far-known (Rave, 2016).

[14] Thereby, other papers often skip this step by assuming that the term innovation speaks for itself. The variety of existing terms and fields of applications proves that the quite the contrary is true.
[15] Or the process of generating something novel (Rave, 2016).

- The third dimension refers to the question, **for whom the innovation appears to be novel** and, in doing so, highlights the subjectivity of innovation. Do only experts consider the alternative solution as innovation, a whole region, industrial sector, or even the state or world society?[16]
- The next dimension stays on the actor level and asks **by whom the innovation has been triggered** (Hauschildt et al., 2016). While it was lined out before that technical innovations tend to emerge in the business sector, the range of actors that can bring about social innovations is much wider, embarking civil society, public but also private players (Rave, 2016).
- In continuation, dimension five asks for the **processual stage** in which the innovation is being situated (Hauschildt et al., 2016). By that, three central phases can be distinguished: the phase of invention and experimentation, the phase of implementation and commercialization and the phase of diffusion or up-scaling (Arentsen & Bellekom, 2014; Rave, 2016). This also makes clear that innovation is an activity that goes beyond pure invention.
- Finally, the last dimension highlights the **normativity** claim of innovation. The normative dimension is based on the assumption that the potential 'user' of the innovation has certain targets or objectives. The innovation therefore has to contribute to the achievement of these targets in order to be perceived as innovation. In economic theory, analysis usually is about expected sales numbers, efficiency gains or economic savings (Hauschildt et al., 2016). However, in the case of this paper, cities, not companies, shall be regarded as potential 'users' of developed innovations and, therefore, it is expected that the target system is more complex.

Hence, whether something can or cannot be regarded as innovation can only be stated if analyzed accordingly. The above elaborated dimensions shall, therefore, provide the framework for identifying alternative or innovative power initiatives in this paper. Thereby, the content and normativity dimensions are the ones who provide most crucial information on whether a project can be regarded as innovation, while the others rather give information on qualitative differences and shall therefore not be focused at. The content dimension, however, also implies that a demarcation of conventional solutions cannot be avoided in order to identify alternative power initiatives. In a next step, their benefit to cities and their citizens shall be highlighted by analyzing in which way they contribute to a cities' target system. Nevertheless, first, a more concrete understanding of the general target system of cities needs to be gained.

[16] The perception that innovativeness of alternative power initiatives is still not well enough understood was one of the main motivations for this paper.

Consequently, the 'New Urban Agenda', which was agreed on during the UN-Conference on Housing and Sustainable Development (Habitat III) 2016 in Quito (Habitat III Secretariat, 2017; UBA, 2016), was chosen as framework to shed light on cities' target systems. The agenda aims at fostering sustainable urban development with the aim of leading to prosperity and an improved quality of life for all urban citizens and, therefore, outlines specific goals that local governments should follow, which are to:

> "end poverty and hunger in all its forms and dimensions; reduce inequalities; promote sustained, inclusive and sustainable economic growth; achieve gender equality and the empowerment of women and girls [...]; improve human health and well-being; foster resilience; and protect the environment" (Habitat III Secretariat, 2017, p. 3, No. 5)(New Urban Agenda, 3, No. 5).

Hence, the New Urban Agenda has a social, economic as well as an environmental dimension. It is being considered as toolkit and guideline for municipal actors and as the translation of the Sustainable Development Goals (SDGs) into urban terms. It is a framework that was agreed upon by the member states of the UN and is, thus, internationally valid. Furthermore, city representatives had the possibility to take part both in the preparation of the text as well as in the conference[17] itself (Habitat III, 2018a; Habitat III Secretariat, 2017; UBA, 2016).[18] Due to the applied participatory and inclusive approach, the New Urban Agenda is said to be universal in scope and, hence, accounts both for big or even mega cities but also small towns – regardless from the country or continent in which they are situated (Habitat III Secretariat, 2017). Therefore, it can be assumed that the agreed upon outcome and the therein outlined goals constitute a target system with which the urban actors can identify widely.

Consequently, the above mentioned seven goals 'end poverty and hunger', 'reduce inequalities', 'promote sustained, inclusive and sustainable economic growth', 'achieve gender equality and the empowerment of women and girls', 'improve human health and well-being', 'foster resilience', and 'protect the environment' shall be understood as dimensions for evaluating a project's normativity gains in the sense of this paper. Accordingly, alternative energy initiatives will be tested to whether they contribute positively to realizing these goals. By this means, information on the wider beneficial effects of alternative energy initiatives will be derived. Still, the dimensions are rather abstract and, therefore, they shall shortly be explained in more detail – but will particularly get clearer later, when applied.

[17] in informal hearings, certain panels but also via the second World Assembly of Local and Regional Governments (Habitat III Secretariat, 2017)

[18] In general, the Habitat III Conference is considered being one of the most inclusive United Nations conferences. In total 30,000 participants from 167 countries participated in the conference (Habitat III Secretariat, 2017).

- The goal 'end poverty and hunger', on the one hand, contains the target to eradicate extreme poverty but, at the same time, highlights the wish to improve the living standard of people in general. A special focus thereby lies on people living in slums or other informal settlements. The latter is something that may not account so much to the German case. Still, poverty is not an absent issue in Germany. In order to adjust the goal to the German context it shall be called **'reduce poverty and improve living-standard'**.
- The next dimension comprises the **improvement of** both **human health and well-being**. Everything that affects them in a negative way shall be prevented. This task reaches from the provision of healthy and hygienic conditions, via the promotion of safety to the elimination of factors that can cause stress, such as noise. It is therefore not only about physical well-being, but also about the mental one and life-satisfaction overall.
- In continuation, the dimension 'reduce inequalities', on the one hand, aims at ensuring equal rights and opportunities to all people living in the city, irrespective of their socio-economic, cultural, background, physical constraints, gender, or other factors. However, it goes even further by tackling the problem of social segregation and inequality and strives for overall social cohesion. In order to be clearer about its content, the dimension shall, therefore, be named **'reduce inequalities and foster social cohesion'**.
- In the next step, the gender-aspect is being emphasized as women were detected to be a certainly vulnerable group[19]. In this respect, cities are not only asked to prevent discrimination, harassment and all other forms of violence against women but to further encourage women to actively participate in society as well as in politics. As the equality aspect is already tackled in the preceding dimension, more emphasis shall here be lain on empowerment. Accordingly the dimension is named: **'empower women and girls'**.
- Eventually, the so far rather socially connoted dimensions are being supplemented by an economic goal. Cities shall promote sustained economic growth that at the same time is inclusive and environmentally sustainable. This shall on the one hand be reached by transforming the economy or industry of a city into a green economy and by sustainably changing production and consumption patterns. On the other hand, this implies that citizens shall eventually benefit from the growth being generated. This also comprises the tasks to foster full employment, create decent jobs, and promote local value creation, besides many others. However, as the environment gets its own goal, the dimension here shall be called **'promote inclusive economic growth'**.

[19] Other vulnerable groups in the sense of the 'New Urban Agenda' are children and youth, older and disabled people, low-income groups, displaced and homeless people, refugees and migrants, disaster- and crisis-affected persons, indigenous people and local communities (Habitat III Secretariat, 2017).

- The dimension **'foster resilience'** aims at reducing the urban citizen's overall vulnerability and at increasing their capacity to manage and adapt to shocks, crises, and catastrophes. The New Urban Agenda, thus, lays its focus on disaster risk management and climate change adaptation. However, it doesn't particularly exclude other risks, such as financial crises, and therefore a broader understanding of the dimension shall be applied in this paper.
- Eventually, cities need to find a way to **protect and restore their ecosystems and biodiversity**. Therefore the dimension comprises all actions that reduce environmental pollution, as well as the consumption of natural resources, and sustainable use of land. Also, the challenge to mitigate climate change is particularly being highlighted (Habitat III Secretariat, 2017).

The seven dimensions can be analyzed separately. Nevertheless, they are interlinked and some dimensions can only be tackled by taking others into account. As they touch upon social, economic but also environmental issues, sheer technical solutions – that are rather motivated by finding solutions that enhance a companies' ability to compete or generate profit – are not expected to be innovations as in the sense of this paper. It shall rather be looked for alternative initiatives that are innovative in a cross-cutting, hence, socio-ecological way.

3. Innovation Management

The question of how to effectively manage innovation has been part of innovation research since its early stages (Disselkamp, 2012; Hauschildt et al., 2016).[20] Irrespective of the type of the analyzed innovation, the focus of innovation research has mainly lain on the identification of factors and conditions under which an innovation could be successfully established and potentially even be scaled up[21] (Rave, 2016; Seyfang & Haxeltine, 2012; Wolfram, 2014). The innovation process shall not be left to chance, but rather asks for management action to provide for the best possible outcome. This is when the concept of innovation management enters the place. In a functional understanding, the term management comprises a multitude of tasks, actions and instruments[22] that in their combination lead to the realization of a decision or objective. Hence, it can be understood as goal-orientated steering process. In the case of innovation management the desired goal is the positive design of an innovation processes so that at the

[20] The transformation research approaches developed the innovation management idea further into concepts such as strategic niche management (SNM) and 'real-world laboratories (see Bauknecht et al., 2015; Grießhammer & Brohmann, 2015; Schneidewind, 2014).

[21] Transition management theory goes in a similar direction, asking for conditions under which the niche innovation can be mainstreamed and eventually replace the regime. However, as this paper rather asks for the broader benefit of innovative 'Energiewende' initiatives for the urban society and not so much for their transformative potential, the broader innovation management approach was chosen for further analysis.

[22] This could be "the definition and pursuit of strategies and goals, decision-making, the determination and influencing of communication, creation and organization of social relations, exertion of impact on partners" (Hauschildt et al., 2016, p. 67*) and others.

end innovation is being generated and/or effectively diffused. The core question, therefore, is how the process as well as the system in which the process occurs need to be shaped and steered so that the innovation can be regarded a success (Disselkamp, 2012; Hauschildt et al., 2016).

Consequently, Disselkamp (2012) differentiates between two levels of innovation management, namely the management of the institution, hence the innovation environment, and the management of the innovation process itself.

The institutional level consists of the four dimensions 'willingness', 'openness', 'capacity', and 'action'.

- The **willingness** dimension asks whether the organization or enterprise and its employees are actually ready to be innovative and willing to perceive novel solutions as innovation. If not, the very first task of innovation management is the creation of inner-organizational motivation for change and innovation.
- The dimension **openness** then asks whether space was created so that innovations could be developed or whether structural or cultural barriers are hindering creativity and the innovation process. This goes into the same direction as the formerly mentioned assumption that innovation emerges in niches. Here the task is to identify and eliminate cultural and structural hurdles while creating an enabling environment.
- The third dimension of **capacity** reflects on whether the people who are expected to create innovation have sufficient resources as well as the personal capacity to do so. Here, the focus lies on the factors money, equipment, time and knowledge. Consequently resource needs need to be identified and solved accordingly.
- Finally, the **action** dimension concentrates on the question whether the innovation process is actually being steered and guided or whether no systemic and goal-orientated management of the innovation can be identified. Here, the role and competence of the innovation manager is being analyzed. The management – here used in the institutional understanding – has to choose and apply the right set of instruments and incentives to foster innovation. This is not always an easy task (Disselkamp, 2012).

The other level, the process level, also consists of several steps that build on each other, namely the phases 'identification', 'selection', 'preparation', 'realization' and 'reflection'.

- The phase of **identification** means the development of innovative alternatives. Here new ideas are generated, old ones revived or developed further. Creativity is of crucial importance during that phase.
- From this abundance of collected ideas in the next step, the **selection** phase, some ideas are chosen to be supported and developed further. This requires structuring, in order to get an overview, as well as the application of evaluation methods.

- Only then, in the third phase of **preparation**, questions of production and commercialization are being asked and answered. This implies the planning of the next steps as well as an analysis of regulatory constraints, market conditions and 'user acceptance'. From this moment on, the applied methods and techniques are comparable to the ones applied in classical project management.
- The next phase of **realization** then finally describes the actual launch, implementation and commercialization of the innovation.
- Eventually, the fifth phase of **reflection** highlights the need for controlling but also for acknowledgement of success (Disselkamp, 2012).[23]

Depending on the respective step, in which the innovation process proceeded, different methods and instruments[24] need to be applied. However, before one can dive deeper into the selection of instruments for the management of innovations, two basic questions need to be answered:

- First, **who is going to be the manager of innovation** in the case of this thesis? This has further implications on the available instruments and, hence, on management options (Grießhammer & Brohmann, 2015). As the institutional context of this thesis shall not be private companies, but cities, classical economic methods may not always be directly applicable. However, this can also mean that other instruments and strategies are available, to which companies wouldn't have access to.
- Second, **what is being considered as innovative** by the management? As elaborated upon briefly before, the identification and selection of innovations marks the beginning of processual innovation management. The classification of solutions and alternatives as innovations triggers different management action as in the case when their innovativeness is not being perceived. This implies that novelty first needs to be actively recognized before it can be managed (Hauschildt et al., 2016). Furthermore, many researchers found that the innovativeness of sustainability initiatives has so far often been overlooked (Rave, 2016; Rückert-John et al., 2014; Seyfang & Haxeltine, 2012; Seyfang & Smith, 2007). Hence, being clear about the alternative power projects' innovativeness is not only a basic precondition but also of certain scientific interest and shall, thus, be made sure in chapter III.5.

[23] It therefore constitutes a cyclical process that provides for corrective adaptation.
[24] A comprehensive overview of potential methods is being provided in Disselkamp (2012) and Hauschildt et al. (2016).

4. Cities as Innovation Managers

Before proceeding further, we need to clarify who is considered as an innovation manager. As context for this thesis the urban arena was chosen, hence, cities are going to be perceived as innovation managers in this paper. This is due to a variety of reasons:

Nowadays, cities are confronted with a multitude of challenges, such as rapid urbanization[25] and urban expansion, globalization, and climate change[26], which all pose a threat to the continuous and reliable provision of urban services[27] as well as the dignity, health and security of urban citizens. In order to enable their citizens to live a qualitative life, also in future, cities increasingly feel the pressure to find new solutions and ideas of how to tackle the piling social and ecological problems (WBGU, 2016). However, cities do not only feel the effects of global megatrends but also substantially contribute to their formation themselves. Although cities only occupy 2% of global land area, they account for more than 60% of global energy consumption, 70% of greenhouse gas emissions and 70% of global waste production (Aderhold, Mann, Rückert-John, & Schäfer, 2015; Beuermann, 2014; Habitat III, 2018b; IRENA, 2016); and this is going to be intensified with urbanization (Aderhold et al., 2015)(see figure 2). Hence, cities are the place where solutions need to be sought.

Nonetheless, due to their strong contribution to global problems, cities are increasingly being perceived as important change agents[28] (Grießhammer & Brohmann, 2015; Klemme & Ginski, 2014) and key actors in the course of the great transformation (Beuermann, 2014; Grießhammer & Brohmann, 2015; WGBU, 2011). This has especially been the case since transformation research found that cities and municipalities were the ideal actors to actively manage the development of niches (ibid.), but also the optimal level for 'Reallabore' (real-world laboratories) and other transition labs (Aderhold et al., 2015; Bauknecht et al., 2015; Grießhammer & Brohmann, 2015; Schneidewind, 2014; Wolfram, 2014).[29] As such they constitute "areas

[25] "The half of world population, since 2008, has been living in urban areas. Until 2030 the degree of urbanization is going to rise up to 60 percent, which relates to a city population of about five billion people." (Aderhold et al., 2015, p. 63*)

[26] "An estimated 70% of all cities are dealing already with the effects of climate change (C40, n.d.). As 90% of all urban areas are coastal, the damage from rising sea levels and severe storms will only increase." (IRENA, 2016, p. 13)

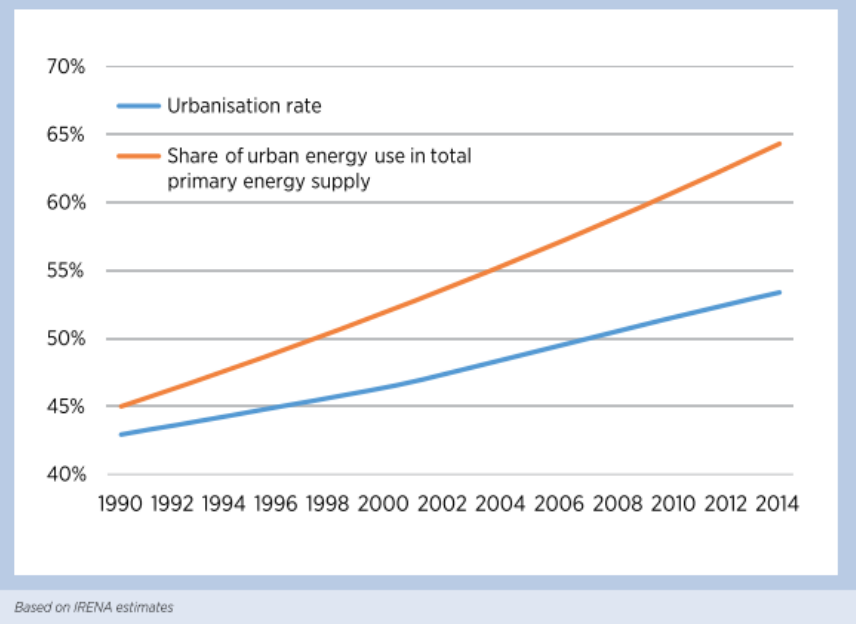
[27] Urban services comprise a multitude of provisioning (safety, health, food security, infrastructure, housing, economy and employment), regulating (diffusion of goods and services, urban governance, …) and supporting (financing, administration, urban planning and development) as well as cultural services (education, religion, entertainment, art, heritage, identity) (own categorization in reference to ecosystem services) (Habitat III Secretariat, 2017).

[28] "Change agents are persons […] [or] organizations that trigger and maintain innovation processes. They can be characterized by their vision, positive attitude towards change, high capacity to interact, influence (decision-making power) as well as their thematic and process knowledge." (Singer-Brodowski et al., 2014, p. 7*).

[29] "In this context there exist many points of contact with, e.g. the transition town movement or more sectoral initiatives such as the development of renewable energy regions." (Grießhammer & Brohmann, 2015, p. 23*)

of experiment and innovation for societal change. They make it possible to coordinate complex societal systems and shape them in a new way." (Aderhold et al., 2015, p. 63*)

Figure 2: Global urbanization rate and share of urban energy use in total primary energy supply, 1990-2014



The share of urban energy use in the global energy mix is increasing faster than the global share of urban population.

Source: IRENA (2016, p. 11), Renewable energy in cities

Thereby, the cities' advantage lies within their scale. They are small enough to not lose overview on the transition process but at the same time big enough to exert certain leverage on the national level.

> "Cities are locations in which the socio-technical system of modern societies is almost entirely echoed – from energy and heat provision via alimentation, the provision of mobility, till education and cultural functions – but, in comparison to countries as object of reference, seem to be controllable in their complexity." (Schneidewind, 2014, p. 3*)

Hence, management of transformation seems to be easier on city-level (Grießhammer & Brohmann, 2015; Vogel, 2013). A special benefit of cities also lies within their local setting and, hence, the closeness to the citizens. It is the level where "[d]ecision-makers, local businesses, and other stakeholders, as well as households and individuals can directly interact" (Beuermann, 2014, p. 37). Moreover, their exceptional knowledge about local peculiarities can be most fruitfully considered on city-level (Berlo, Wagner, Drissen, Baur, & Theuer, 2017; Grießhammer & Brohmann, 2015). Hence, cities can be regarded as competent shapers of local transformation processes, in which innovation management plays a crucial role.[30]

[30] Also successful concepts like the transition town movement (Hopkins, 2008, 2010) contributed to the high expectations that now rest on cities.

Another reason, why cities were chosen to be looked at as innovation managers in this paper, is that cities more and more find themselves in competition with other cities for human and accordingly financial resources. As urbanization[31] is focusing on metropolis, smaller cities experience depopulation and consequently problematic demographic change and economic consequences (Aderhold et al., 2015; World Economic Forum, 2016). This is where research on regional development enters the place (Cooke, 2010), but also concepts such as 'competitive cities' are rooted here (Wolfram, 2014). In line with the understanding that innovation is a central precondition for development (see chapter III.1.), innovation can be regarded as important element for city development, too.

All of this implies that cities are arenas in which innovations are of particular importance and, hence, an intrinsic interest of cities to be innovative themselves or to foster innovation can be assumed. However, the question whether the perception that cities can act as innovation managers is consistent with the theoretical framework still needs to be answered.

In the classical Schumpeterian understanding the development of innovation is the task of so called 'entrepreneurs' (Schumpeter, 1980). The entrepreneur is of central importance to the innovation process, because he/she initiates innovation and makes sure that it is put into place (Suman, n.d.). This is the origin of the assumption that innovation can be managed. However, unlike one would assume judging by the term 'entrepreneur', Schumpeter did not specifically restrict the application of the entrepreneural concept to private companies and enterprises. As Rave (2016) puts it, Schumpeter's definition of entrepreneurs is purely functional and, thus, also other institutions such as civil society organizations or state actors can produce and diffuse innovation (ibid.). Similarly, the so far mentioned and applied innovation management handbooks (Disselkamp, 2012; Hauschildt et al., 2016) refrain from defining who is eligible for executing the role of innovation management. They use innovation manager in a rather abstract and institutional way, so that it can be applied to a broad range of actors. Consequently, also cities, in an organizational understanding that embarks all its institutions, can and will be perceived as innovation managers in this paper.

Nevertheless, one has to acknowledge that cities follow a fundamentally different functional logic then business actors. Most importantly, one has to recognize that the guiding paradigm of urban players does not consist of profit maximization but rather follows the principle of 'good is what is good for the city population' – i.e. they rather strive for the maximization of 'public value' (Aderhold et al., 2015; Berlo & Wagner, 2015) (see outlined target system in chapter III.2.).

[31] "In 1900, just 13% of people lived in cities; by 1950, the proportion rose to 29%. The share of the world's population living in urban areas is expected to increase to 66% by 2050" (World Economic Forum, 2016, p. 9).

Also, the inner structure and organization of cities as well as their available management instruments deviate substantially.[32] This does, however, not limit their capacity to act as innovation manager. Local governments possess a wide range of competences and instruments that sometimes even exceed the possibilities of private actors. Foremost, it shall be noted that cities have the right to command over their own local affairs. This local autonomy or right for self-government is guaranteed in Art. 28 of the German constitution (GG) – it is of course limited by the cities' embeddedness in a multi-level governance system. Still, cities have their own institutions, laws and policies, resources and even governments – which enjoy proper democratic legitimation (Rave, 2016). This builds not only the basis for e.g. local climate and energy policy (Berlo & Wagner, 2015), but also for cities to become active innovation managers. Thereby, they benefit from the huge variety of roles that they can take and of which each brings with it a wide range of instruments. Cities are regulators[33], city planners and designers[34], owners of infrastructure and thereby direct consumers – but in some cases also generators[35] – of energy (i.e. potential role model), financiers[36] of energy projects, service providers, advocates, consultants as well as promoters and facilitators (Arentsen & Bellekom, 2014; Habitat III Secretariat, 2017; IRENA, 2016; World Economic Forum, 2016). Especially due to their regulation and planning roles, competences vastly exceed the possibilities of private businesses.[37] However, local governments can also apply rather classical innovation management tools, such as public relation and communication, human resource management, R&D programs, project management, or re-structuring their inner organization (Disselkamp, 2012; Habitat III, 2018b; Habitat III Secretariat, 2017; Hauschildt et al., 2016). The concrete possibilities for exerting innovation management will, however, eventually get clearer when applied to the exemplary case of Berlin (see chapter IV.4).

[32] Generally speaking, the difference is also being expressed by the fact that in the private-sector environment the term 'management' is being applied, while for state actors, such as cities, favor the term 'governance'.

[33] Cities command over local rules and policy by developing and implementing urban legislation (e.g. policies, strategies, goals or targets and even city charters) and regulation (plans, frameworks, codes, permits, ordinances, sanctions, …) (Habitat III Secretariat, 2017).

[34] They further have the power to steer their own territorial and spatial development by applying instruments of urban planning and design (city region/metropolitan plans, urban territorial and other master plans, zoning, guidelines, building codes, …). In this context cities plan and construct houses, infrastructure (water, sanitation, energy, telecommunication, transport, …) and public places (e.g. parks, market places, squares, streets, sidewalks and cycling lanes) and thereby determine the physical conditions, speed and direction of, for instance, the economic development of a city (Habitat III Secretariat, 2017).

[35] In this context municipal energy utilities play a crucial role (see Berlo, Wagner, Drissen, et al., 2017; Dannemann et al., 2016), as we will see in chapters III.5.2. and IV.3.

[36] As enterprises, cities have a budget and financial means that they can invest – albeit resulting from local fees, taxes and charges for public services granted and not from the selling of goods and services. Beyond that, cities can promote and leverage private investment, e.g. by giving incentives. They are eligible to receive project money from (inter-)national public funds – in a much more extensive way than private companies – and it is even thinkable that cities create their own financial institutions, such as local development banks (Habitat III Secretariat, 2017).

[37] Cities can create market structure that businesses operate in but have no direct influence at.

5. Alternative Power Initiatives as Innovations

One basic hypothesis of this paper is, that in the course of German energy transition a variety of alternative power initiatives has emerged that innovatively finds solutions to a diverse range of challenges that cities are confronted with. If so, the cities would substantially benefit from supporting that kind of initiatives. However, first respective projects need to be identified, by contrasting them to the conventional solutions of the power sector (chapter III.5.1.). Then, they shall be looked at with the socio-ecological innovation lenses (chapter III.5.2.). Thereby, special focus shall be lain on their potential benefits and contributions to a cities' overall target system as lined out in chapter III.2.

5.1. German Energy Transition – Alternatives on the Rise

In order to identify alternative power projects, an overview of the developments in the course of German energy transition shall be given. In this paper, due to limited scope and the fact that the German energy transition has so far rather focused on the electricity system, special attention shall be directed to developments in the power sector.

Since the 1890s, the power system has developed to constituting a crucial part of society as well as of the national economic system (Brauner, 2016). The power system, which initially could be characterized by its decentral and small-scale production and distribution units, over the years and especially after World War II, had developed into a central electricity system.[38] In such a system, electricity is produced by a small amount of large-scale power plants[39] and transported over long distances, via a cascade of stable transmission and distribution grids, to the consumers – or so called load centers (Arentsen & Bellekom, 2014; Dannemann, Kajimura, & Müller, 2016). The central electricity system is, hence, a rather top-down organized system in which electricity flows unidirectional (Dannemann et al., 2016) (see figure 3).[40]

The process of centralization resulted in the installation of a large-scale, German-wide – and in the further development also European-wide – connected electricity economy and market (Berlo & Wagner, 2015). In combination with the rising phenomenon of de-municipalization of local energy supply, between 1955 and 1971, this had further triggered that the energy economy started to narrow down to the hands of a limited number of businesses (Berlo & Wagner, 2015; Berlo, Wagner, & Heenen, 2017). Ever since, the energy economy had been dominated by the big market players E.ON, RWE, EnBW and Vattenfall (Berlo & Wagner, 2015; Burck, Schinke,

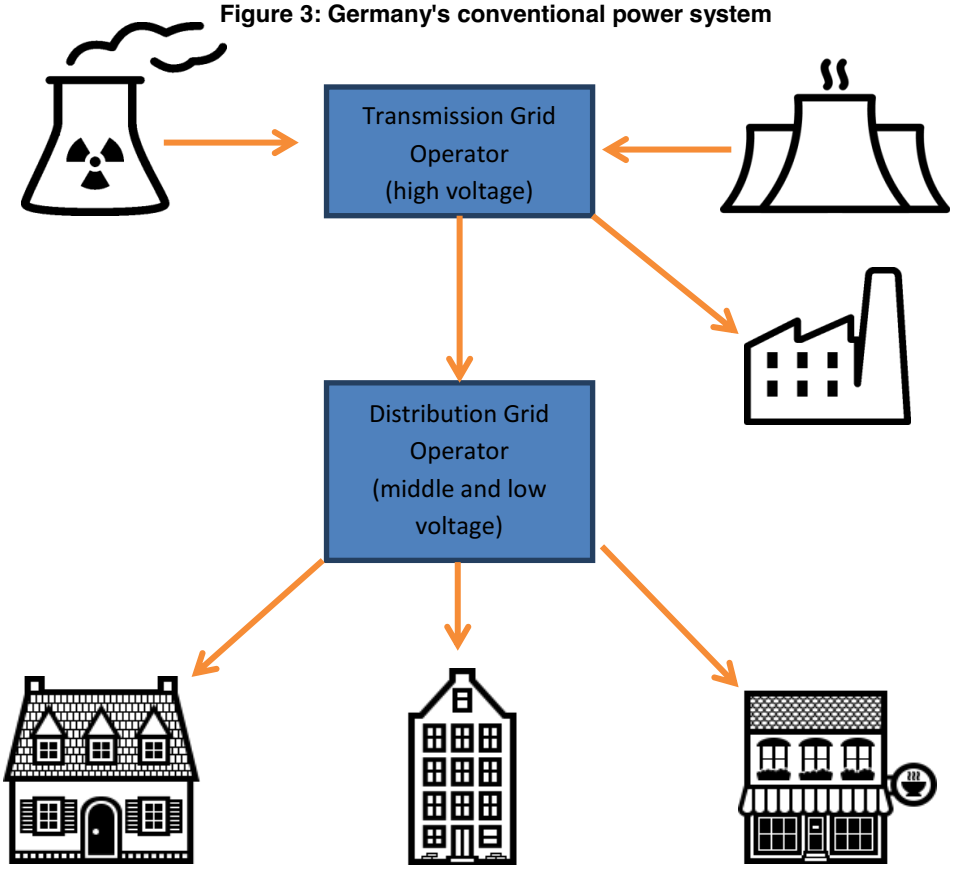
[38] This development was fostered by an agglomeration of technical innovations (large-scale power plants, the three-phase current technique, …) as well as a change in paradigm towards favorable prices and safety of supply, on the other hand (Berlo & Wagner, 2015; Berlo, Wagner, & Heenen, 2017).

[39] "No matter what the energy resources may be (fossil, hydro, nuclear or renewable), the technology is large in scale and centrally managed by the grid." (Arentsen & Bellekom, 2014, p. 6)

[40] The energy system is therefore often referred to as (highway) one-way street (Dannemann et al., 2016).

Marten, Hermwille, & Beuermann, 2014). "They are producers, operators, and suppliers at the same time, and thus also control the republic's power system." (Burck et al., 2014, p. 26)[41]

Figure 3: Germany's conventional power system



Source: own illustration; orientated at Agentur für Erneuerbare Energien (2018b); icons derived from http://www.iconarchive.com

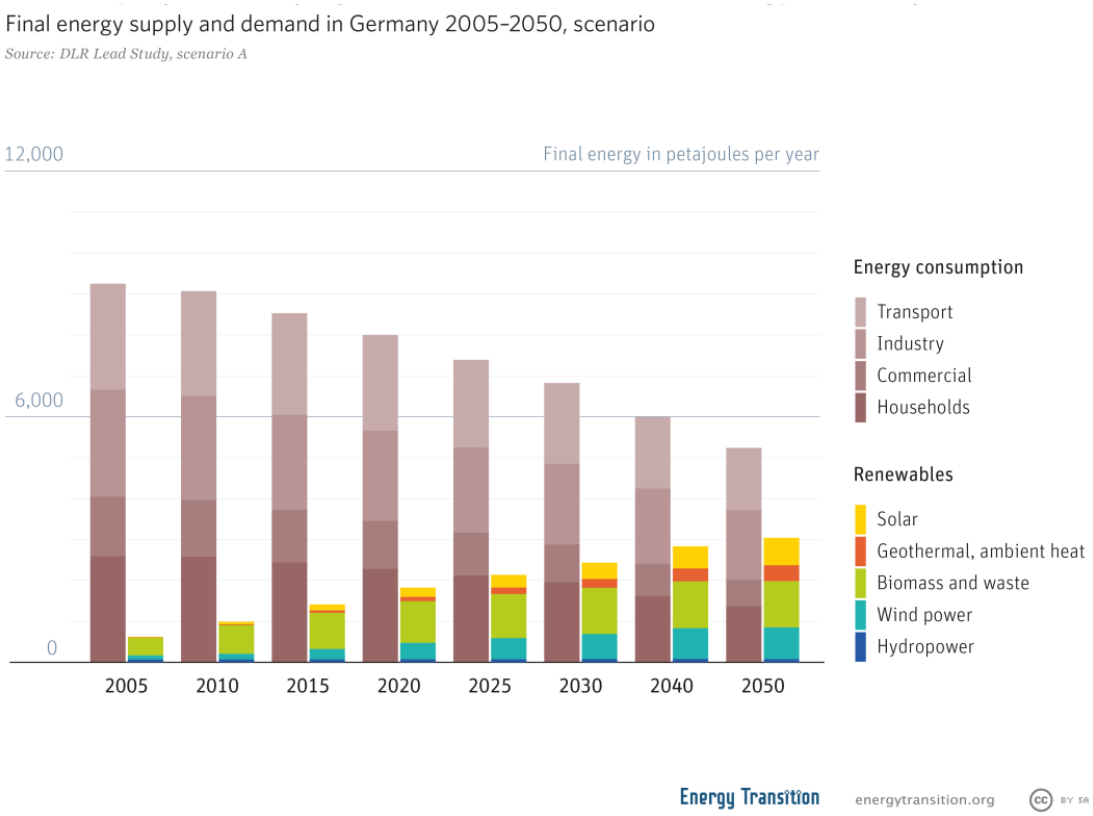
Due to this strong economic concentration of the power system in the hands of few, it can also be characterized as being quasi-monopolistic. However, as the monopolies mainly lay within the responsibilities of private companies, operations started to be profit-orientated (Arentsen & Bellekom, 2014).

After having established its central characteristics (see figure 3), the power system of Germany had only altered slightly until the 1990s and, therefore, constituted a rather stable system. However, this has been changing since the 'Energiewende' has demanded the system to undergo a fundamental structural transformation process (Berlo & Wagner, 2015). The term 'Energiewende' describes the German plan to phase out of conventional power (nuclear and fossil) while simultaneously switching to renewable

[41] "The institutional order that can be detected in the 1980s is based on a technical development to ever bigger units and an energy-economic regulatory framework that favors this kind of structures. Emphasized shall thereby be the implementation of the Energy Economy Act [EnWG], in 1935, with which the political commitment to the greater interconnected [energy] market came along."(Berlo & Wagner, 2015, p. 241*)

energies (wind and solar energy in particular) and energy efficiency (Burck et al., 2014) (see figures 4 and 5). [42]

Figure 4: Germany's plan: ramp up renewables, drive down energy consumption

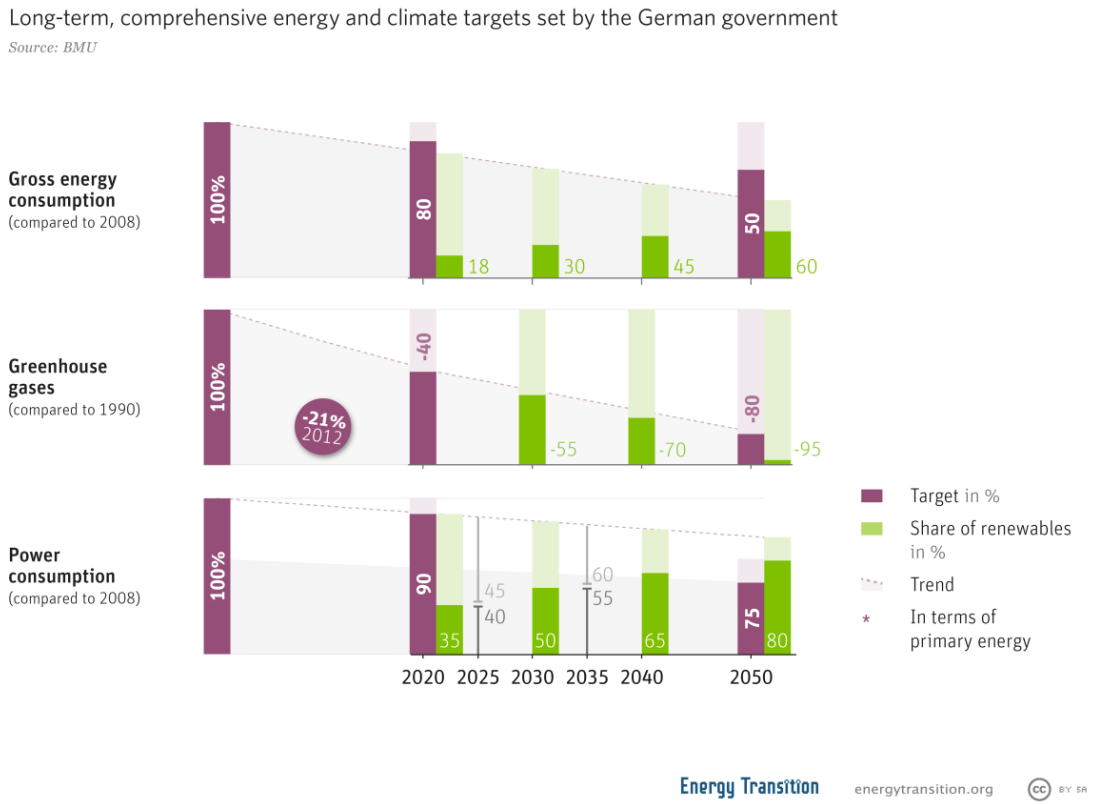


Source: Heinrich Boll Foundation (2018)

Although the goals and targets illustrated in figure 5, are institutionally based on political decisions made in 2011, the beginnings of the German energy transition can be located already in the 1970s (Berlo & Wagner, 2015; Berlo, Wagner, & Heenen, 2017; Morris & Pehnt, 2016). When talking about the 'Energiewende', this paper, therefore, refers to the broader developments since the 70s and not to the short period since 2011.

[42] Both illustrations are built on the targets as outlined in the 'Energiewende' plan, which builds on decisions made by the German parliament in 2011 with 85 %. The astonishing majority can be explained by the nuclear catastrophe of Fukushima which had taken place earlier that year and triggered societal pressure on German politics. From this moment on, the plan to transform the energy system could be regarded as societal and cross-party consensus (Agora Energiewende, 2018).

Figure 5: German energy transition: high certainty with long-term targets



Source: Heinrich Böll Foundation (2018)

The German 'Energiewende' is a politically designed transformation process that institutionally is based on an agglomeration of national targets (especially the 2020 and 2050 targets43), laws (the Renewable Energies Act – EEG, in particular44) as well as strategies (e.g. Sustainability Strategy), plans (e.g. Energy Plan from 2011, Climate Action Plan from 2016) and programs (e.g. Integrated Climate and Energy Program)45 (Agora Energiewende, n.d.; Morris & Pehnt, 2016). However, from its early beginning, the German energy transition has strongly been influenced by citizen activities. Historically speaking, one can even say that the 'Energiewende' "is rooted in the anti-nuclear movement of the 1970s" (Morris & Pehnt, 2016, p. 87)46, was enhanced by energy security as well as

43 The numbers stand for the years in which a certain reduction of CO2-emissions shall be reached (compared to 1990-levels). For 2020 a reduction of 40 % was foreseen while for 2050 a goal of -85 till -90 % was set. The 2020-target was first lined out in the Integrated Climate and Energy Program of 2007 and was re-affirmed in several subsequent plans and strategies. The 2050 goal was first sketched out in the National Climate Targets (min. -80%) in 2009 and then strengthened with the Energy Concept of the Merkel government in 2010 (Agora Energiewende, n.d.; Morris & Pehnt, 2016).

44 In the year 2000, the EEG replaced the Electricity Feed-in Act from 1991. It builds the basis for the integration of renewable energies in the market and has been of outmost importance as it introduced the fixed feed-in tariffs, which enabled smaller market actors and even individuals to participate in the energy system (Morris & Pehnt, 2016).

45 However, the national policies are strongly influenced by European targets (20-20-20) and regulations as well the international climate treaty called 'Paris Agreement' (Agora Energiewende, n.d.; Dannemann et al., 2016; Hermwille, 2017).

46 In the 19070s the first nuclear power plants began to produce energy. The movement then "started with political resistance to the planned nuclear power plant in the German village of Whyl am

price issues that were brought up during the oil crisis (1973-1979), and got further motivated by environmental and especially climate change concerns (Berlo, Wagner, & Heenen, 2017; Brauner, 2016; Burck et al., 2014; Morris & Pehnt, 2016). Due to all these events and the rising awareness of risks associated to the conventional energy supply system, people started to look for alternative ways of organizing energy generation and supply (Berlo & Wagner, 2015; Morris & Pehnt, 2016). For a more detailed overview see Morris and Pehnt (2016) and Agora Energiewende (n.d.).

However, the changes that were triggered go deeper than just shifting from one energy technology to another and this shall now be lined out in more detail.

Power Generation

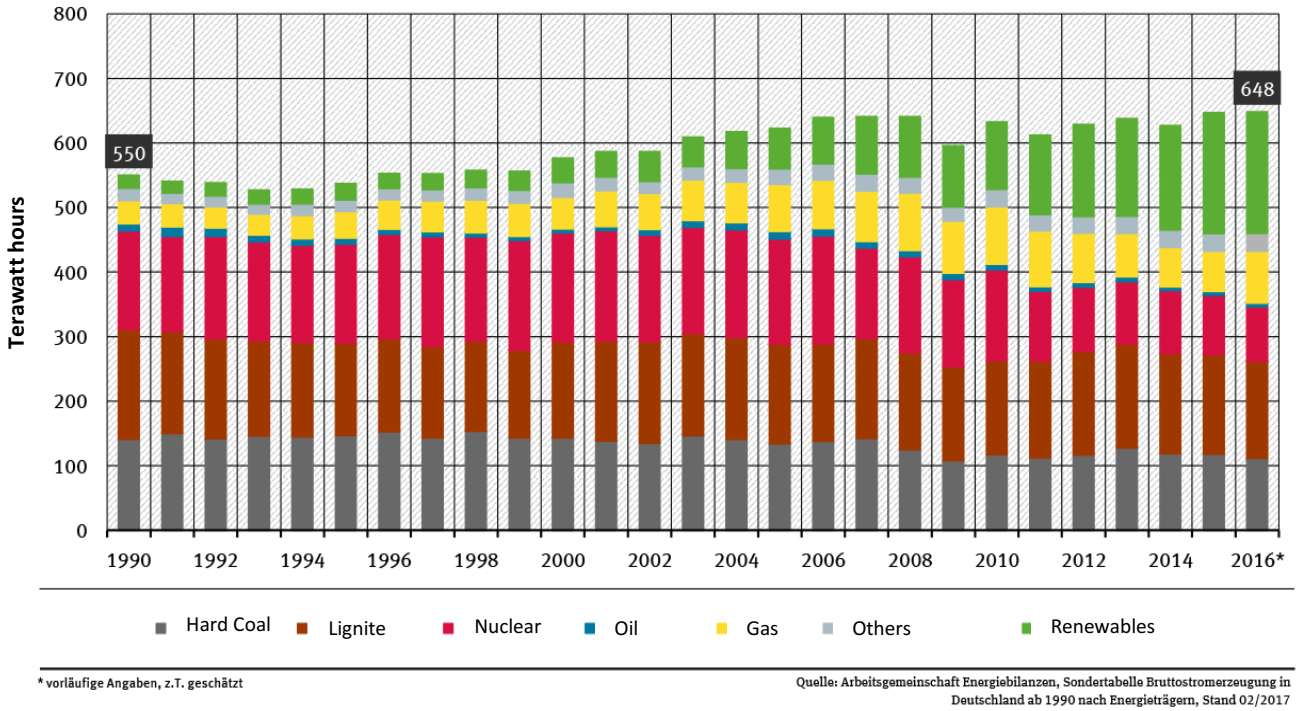
Conventionally speaking, and as it has already been indicated before, since the 20th century, electricity in Germany had been centrally produced by a small amount of about 200 large-scale power plants that where mainly running on fossil (particularly coal) and nuclear energy (Agora Energiewende, n.d.; Berlo & Wagner, 2015; Dannemann et al., 2016; Morris & Pehnt, 2016). For a long time, basically all of the power plants belonged to the four market dominating German energy enterprises E.ON, RWE, Vattenfall and EnBW and operated following the "common market logic" (Berlo, Wagner, & Heenen, 2017, p. 2) and in order to generate profit (Arentsen & Bellekom, 2014; Berlo & Wagner, 2015).[47]

With the 'Energiewende' the phase-out of nuclear energy and the switching to renewable energies – and solar and wind power in particular – was decided upon. While in the 1990s renewable energies played a negligible role in electricity generation, in 2015, they already contributed more than 30 % to gross power generation and thereby replaced lignite as being the core electricity source (see figure 6) (Dannemann et al., 2016).

Kaiserstuhl" (Berlo & Wagner, 2015, p. 240*; see also Morris & Pehnt, 2016) and was further fired by the catastrophic meltdown in Chernobyl in 1986 (Morris & Pehnt, 2016).

[47] This has been especially true "since the introduction of liberalisation [sic!}. The benefits of both supply and demand are privatised" (Arentsen & Bellekom, 2014, p. 6).

Figure 6: Gross Power Generation since 1990, separated according to energy sources (as of 02/2017)



Source: AGEB (2018a); translated from German into English by the author

However, as renewable energies possess fundamentally different characteristics than fossil and nuclear energy technologies, the shift triggered general changes in the power landscape.

As the capacity of renewables is lower than of conventional power plants, a much higher number of small-scale plants is needed in order to meet the demand. Consequently, in 2014, electricity was generated by around 1.3 million distributed facilities instead of by only some hundreds of central power plants (Berlo & Wagner, 2015; Clemens & Ohrem, 2012). This, on the one hand, broke with the preference of large-scale technologies and, on the other hand, inevitably led to a diversification of the actors involved in power generation (Berlo & Wagner, 2015; Netzentwicklungsplan, 2012b).[48] Hence, the market power of the before mentioned 'Big Four' has started to be deconstructed[49] as more and different players entered the market (Berlo & Wagner, 2015; Hermwille, 2017; Morris & Pehnt, 2016).[50] On the one hand, municipal companies started to reclaim the territory of energy generation (see figure 11) making communities and cities more directly involved in energy supply (Arentsen & Bellekom, 2014; Berlo & Wagner,

[48] Besides technological reasons, this development was also fostered by political decisions. Here, especially the changes of the EnWG with the aim to liberalize the energy market as well as the introduction of the EEG with its fixed feed-in tariffs shall be mentioned (Burck et al., 2014).

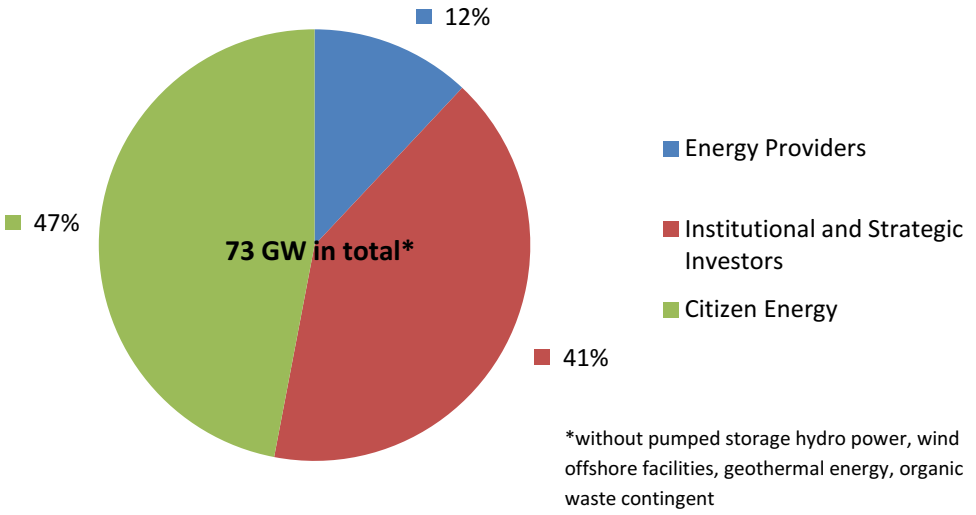
[49] This was reflected by the development of stock values of the respective enterprises (Hermwille, 2017).

[50] Nevertheless, 50% of electricity is still being generated by E.ON and co (Berlo & Wagner, 2015). However, in the reverse conclusion, this means that nowadays half of the electricity in Germany is being generated by other actors than the conventional ones.

2015; Berlo, Wagner, Drissen, et al., 2017). However, also entirely new actors started to utter interest in electricity generation, namely farmers, small- and medium-sized enterprises and citizens (Berlo & Wagner, 2015; Dannemann et al., 2016).[51] This has led to two further developments.

First, the 'do-it-yourself' idea entered the power sector with individuals, and citizens in particular, who started to participate in the market and to generate (citizen) energy[52] on their own (Hauser et al., 2015; Rückert-John et al., 2014). "One in every sixty Germans is now an energy producer." (Morris & Pehnt, 2016, p. 51)(see also figure 7) On the next level, consumption and production were combined and the new actor group of 'prosumers' was born (Arentsen & Bellekom, 2014). Prosumerism deliberated many actors from the 'stranglehold' of the electricity market, as consumers were enabled to satisfy their demand to a great extent with energy that they produced by themselves (IRENA, 2016; Morris & Pehnt, 2016).[53]

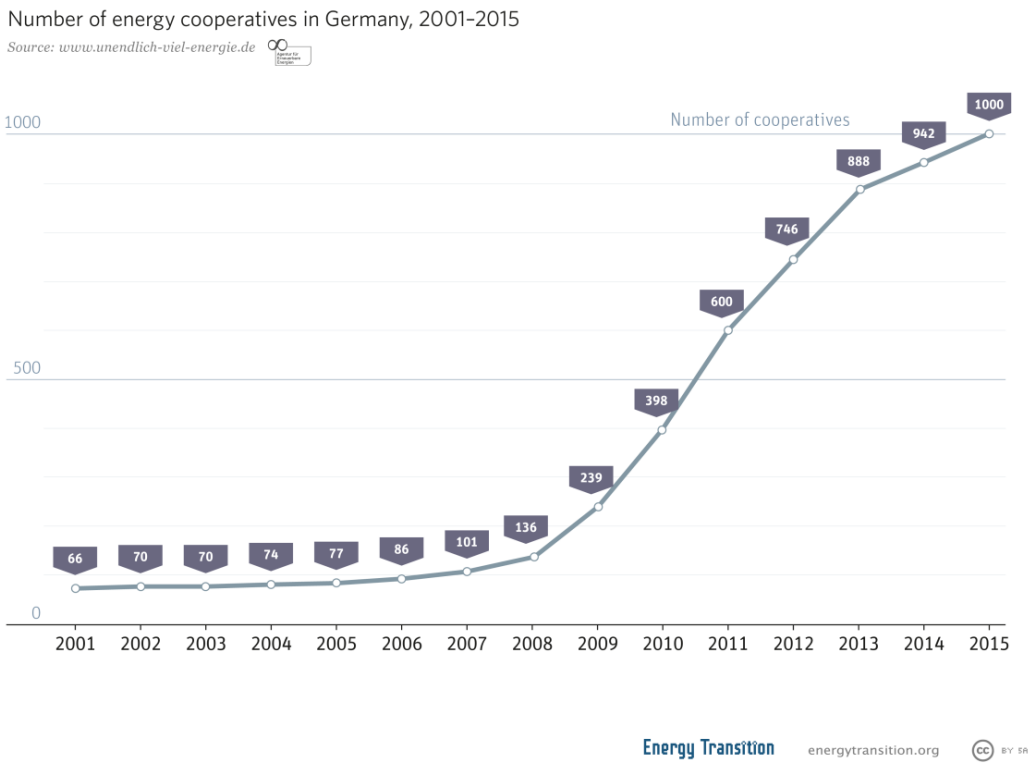
Figure 7: Installed capacity of renewable energies according to ownership structure in Germany, 2012



Source: own illustration based on graph provided by Agentur für Erneuerbare Energien (2018a); data derived from trend research, Leuphana Unversity Lüneburg, state: 10/2013

[51] While for the first actor group biogas was the enabling technology, the two latter mainly benefited from (rooftop) photovoltaic (IRENA, 2016; Morris & Pehnt, 2016).
[52] "The term 'citizen energy' is a neologism that implies a combination of civic engagement with energy generation (on the basis of renewable energies), but also sometimes energy efficiency." (Hauser et al., 2015, p. 1*)
[53] However, prosumerism goes beyond the idea of self-support, as prosumers are even eligible to sell their energy surplus on the market (Morris & Pehnt, 2016).

Figure 8: Citizens form cooperatives to drive the energy transition



Source: Heinrich Böll Foundation (2018)

Second, besides, having the possibilities to take part as individual producers or prosumers of energy, people started to group together to form energy cooperatives (Rückert-John et al., 2014) (see figure 8). Together they can leverage more capital[54] to realize bigger projects and therefore are able to compete with large investors (Dannemann et al., 2016). Nowadays, more than 900 cooperatives contribute to the electricity generation in Germany (Burck et al., 2014; Morris & Pehnt, 2016). With the entrance of the new, rather small and decentral actors and the changing property structures also the profit-orientation of electricity generation is more and more being questioned and put under pressure by ideas of public or community value (Arentsen & Bellekom, 2014; Berlo & Wagner, 2015; Morris & Pehnt, 2016).

The other central characteristic of renewables lies within its spatial occurrence. Unlike fossil and nuclear energy sources, wind, sun, biomass and geothermal power are energy sources that can be found all over the world, and Germany respectively (Dannemann et al., 2016). This implies that there is plenty of regional and local potential (Berlo & Wagner, 2015; Brauner, 2016) and, hence, close-to-the-consumer production of energy

[54] "Overall, it is estimated that 'energy cooperatives' – community-owned renewables projects – had leveraged more than 1.67 billion euros in investments from more than 130,000 private citizens in 2014." (Morris & Pehnt, 2016, p. 55f)

becomes possible again (Arentsen & Bellekom, 2014). This enables the development of new products, such as regional electricity, electricity being produced and consumed in a purely regional value chain. The new locality dimension is also of special interest to communities and cities. Technology enables them to increasingly "organise [sic!] and manage supply and demand at the community level" (Arentsen & Bellekom, 2014, p. 2), so that at the end whole communities or regions can ideally sustain themselves. This is where concepts such as eco-energy villages[55] (Aderhold et al., 2015; Hauser et al., 2015)(Arentsen & Bellekom, 2014) or transition towns (see Hopkins, 2008, 2010) are rooted.[56] Here, the local government, companies and citizens work together with the intention to close the power value chain at local scale in a way that energy autonomy is reached. Often this kind of actor network is organized and financed collectively (Arentsen & Bellekom, 2014; Loske & Vogel, 2017; Rückert-John et al., 2014).

Power Transmission and Distribution

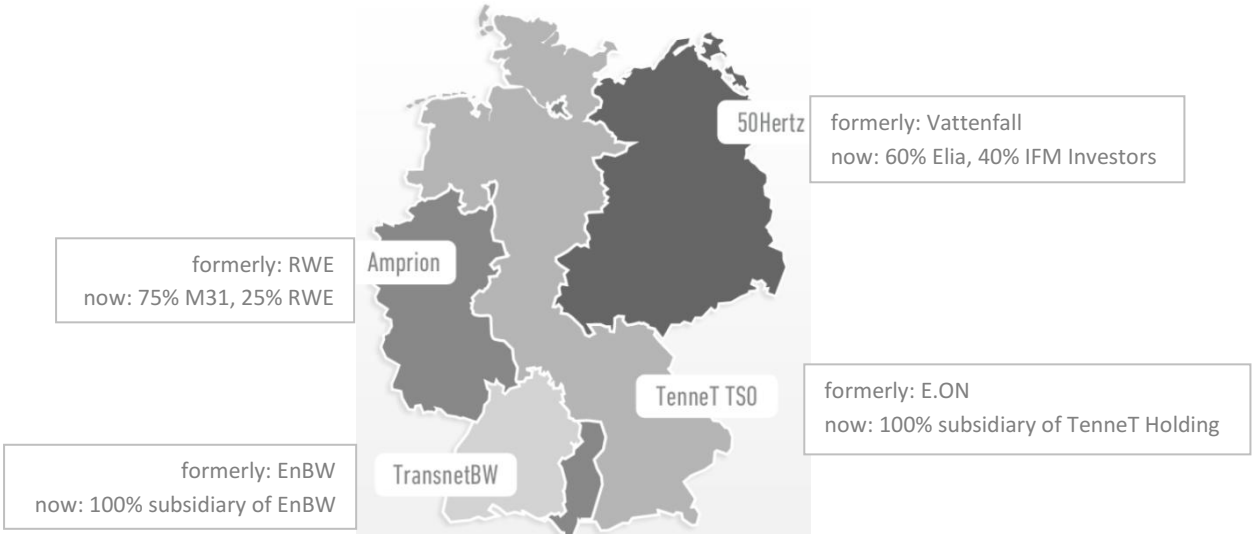
In a centrally organized, wide-span connected power system[57], as it has been the case in Germany after World War II (see introduction to this chapter), the electricity grid plays a central role, constituting the basic infrastructure for transporting centrally produced energy, in a one-way-street manner, over long distances to the load centers (Clemens & Ohrem, 2012; Dena, 2012; Netzentwicklungsplan, 2012b).[58]

Ownership structures in the electricity grid system had first strongly been influenced by de-municipalization tendencies in the 1970s[59] and, later, by liberalization processes (1990s.) Paradoxically, both developments led to a concentration of grid ownership in the hands of the already mentioned omnipresent German energy enterprises E.ON, RWE, Vattenfall and EnBW (Berlo & Wagner, 2015). With liberalization, the unbundling principle was introduced that meant to separate the fields of energy generation, marketing and distribution from grid operation (Agora Energiewende, n.d.; Morris & Pehnt, 2016). By this means, competition should be brought into

[55] The first and most famous example is the eco-energy village Jühnde (Rückert-John et al., 2014).
[56] In eco-villages, transition towns but also climate cities the aim to locally balance power generation and consumption plays a central role (Arentsen & Bellekom, 2014). All three concepts constitute a comprehensive and integrated community transformation strategy (Aderhold et al., 2015).
[57] Here it shall be noted, that the grid system is not only German-wide connected but also European-wide. The process of European grid connection started in 1955 and in the meanwhile comprises central Europe, the Balkan states as well as connections to North Africa (Brauner, 2016; IRENA, 2016).
[58] More precisely speaking, one could say that the transmission grid has played the central role in the system, as the large-scale plants have all been connected to this high voltage type of infrastructure (Dena, 2012). This had made the transmission grid operators (TSOs) being the most important actors in the field of power transmission in Germany, while the distribution grid operators (DSOs), who are in charge of the regional distribution of electricity – that often coincides with city or community areas – have only played an underpart. This power relation had even been institutionalized with the Law for Energy Economy (EnWG) of 1935 (Berlo & Wagner, 2015).
[59] „Between 1955 and 1971, the number of energy supply companies more than halved, from 3000 to 1378." (Berlo, Wagner, & Heenen, 2017, p. 4) During that time, grid operation and power supply were usually exerted by one and the same enterprise. This was only changing since with liberalization – triggered in the 80s by Margareth Thatchers idea of a lean government – the need for unbundling had been introduced politically (Morris & Pehnt, 2016).

the power sector. While the goal was rather reached in the field of energy provision (Berlo & Wagner, 2015; Morris & Pehnt, 2016), it doesn't hold entirely true for grid operation. Between 1995 and 2010, the 'Big Four' had increasingly purchased shares in distribution grids but also started to dominate the transmission grid operation. Between 2000 and 2002 the number of transmission grid operators (TSOs) shrank from eight to only four enterprises which led to a division of the German grid network into four control areas. Only in 2010, after European pressure for further liberalization, the 'Big Four' were forced to sell their transmission grids, so that the transmission grid operation landscape since 2012 looks as follows (Strom-Magazin, n.d.-a):

Figure 9: The four German control areas and according ownership



Source: Netzentwicklungsplan (2012a, p. 2); and own completions

The graph (figure 9) shows that RWE, E.ON and co still hold shares in the grid system. Furthermore, it gets clear that strategical and also international investors are now influencing the transmission grid business (50Hertz, n.d.; Amprion, n.d.; TenneT TSO, 2018; TransnetBW, 2012). On distribution grid level, the actor landscape is more diverse. While, as we just saw, on transmission grid level there is only four operators – namely Amprion, 50Hertz, TenneT TSO and TransnetBW – there is about 900 distribution system operators (DSOs) (Jennes, 2012; Statista, 2018a; Strom-Magazin, n.d.-a). However, ownership structures are similar. Despite unbundling, that accounts for grid operators with more than 10,000 clients, still 50 % of the distribution grids – directly, through share-holding or subsidiary companies – belong to RWE, E.ON and EnBW (Berlo & Wagner, 2015; Berlo, Wagner, & Heenen, 2017). The strong interest of the 'Big Four' and other strategic investors indicates that, despite national regulation of the grid operation, there is high economic interest in the field. As the installation of several parallel grid infrastructures would be economically unviable, grid operation is considered a natural monopoly (Berlo & Wagner, 2015; Jahn, 2014). Nevertheless, in order to mitigate the

economic consequences for clients and to curtail the enterprises' market power, price building and, hence, profit is being regulated by the National Grid Authority (BNetzA)(Bundesnetzagentur, 2018). Still, grid operation is a profitable business with publicly guaranteed yields of billions of Euros and, therefore, is of high commercial interest to private enterprises and investors (Hecking, 2016; Kreutzfeldt, 2016).[60]

This is the point of departure: a centrally organized electricity system, in which a limited number of TSOs play the core role and which is strongly influenced by the commercial interests of the omnipresent energy enterprises E.ON, RWE, EnBW and Vattenfall.

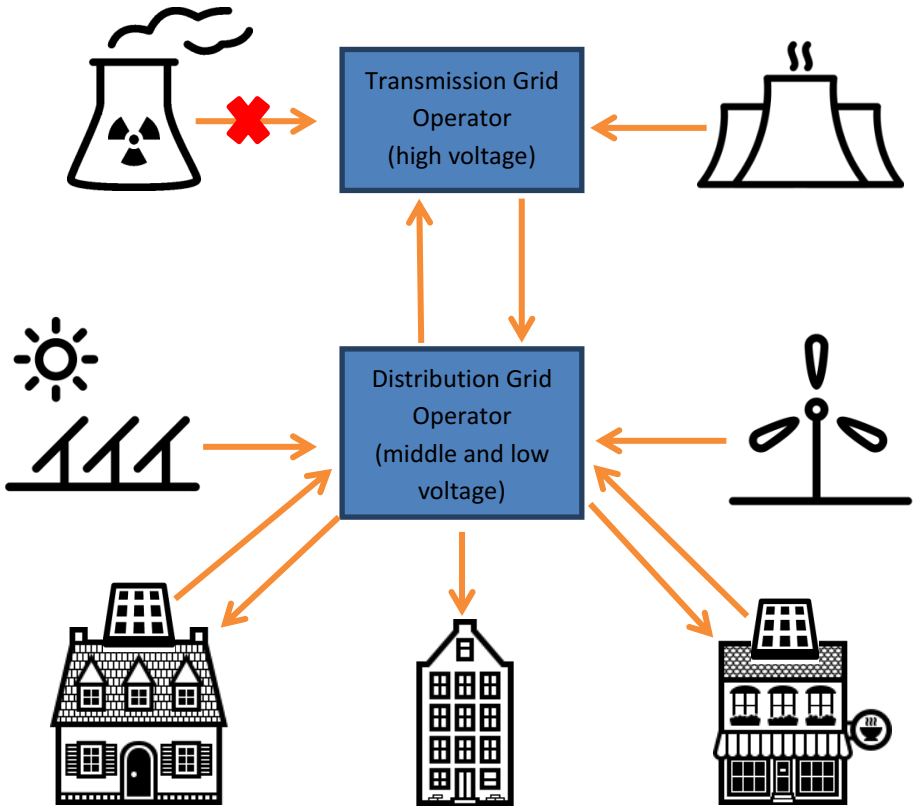
Now, renewable energies come into play, not only decentralizing the power generation system but also affecting the field of electricity distribution (see figure 10). While the large-scale power plants were installed in the transmission grid, renewables are by about 95 % installed on distribution grid level (Clemens & Ohrem, 2012; Dena, 2012). By this means, not only the direction of energy flow is changing (Dannemann et al., 2016) but also the key role in the grid system is shifting from the TSOs to the DSOs, and thereby the market power gets distributed on more shoulders.[61]

In line with the developments in the power generation system, also the grid system has experienced the appearance of new and formerly replaced actors. Accordingly, the so called 'Power Rebels of Schönau' where the first citizen collective was to buy back their local distribution grid, in 1991 (Berlo & Wagner, 2015; Morris & Pehnt, 2016). Ever since, the Schönauer model has served as exemplary case for further grass-root grid movements, such as in Hamburg (successful) and Berlin (not successful) (Morris & Pehnt, 2016). Furthermore, as Berlo et al. put it: "After two decades of privatization and outsourcing being the dominant trends across public services, an inclination towards founding new municipal power utilities can be observed." (Berlo, Wagner, & Heenen, 2017, p. 1, formatted by the author)

[60] Especially since the low-interest-rates policy of the European Central Bank (Kreutzfeldt, 2016).

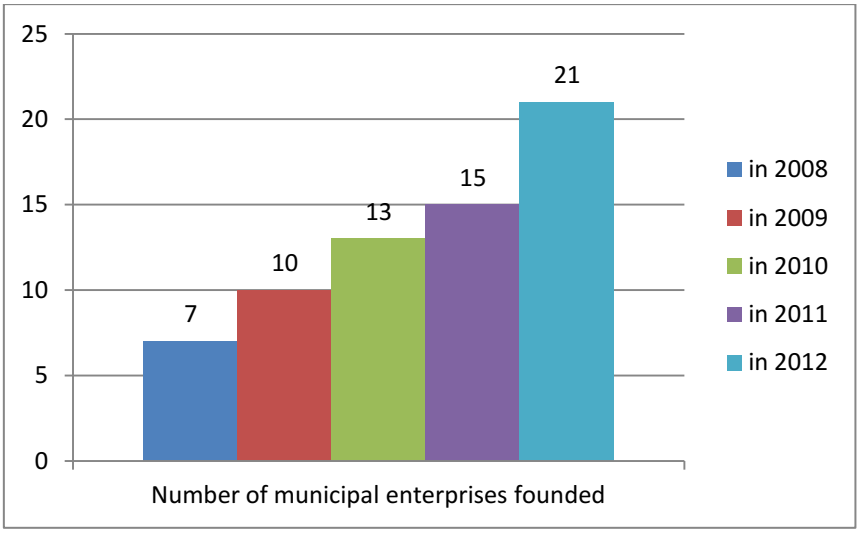
[61] Here, it has to be noted though, that the political decision for a decentral energy system has not been made yet and it is questionable whether it will be made at all. On a political level, efforts are made to keep up the central electricity system of Germany with new transmission lines being built – claiming that they constitute the infrastructural precondition for a successful energy transition – and latest EEG amendment that introduced the tendering approach to the German Energiewende (Agora Energiewende, n.d.). Also, the European energy market integration plans rather foresee a European super grid than a shift towards decentral and semi-autarkic grid systems (Brauner, 2016). The question whether the future grid needs to be rather centrally or decentrally organized is one of the currently main (political) 'Energiewende' conflicts in Germany.

Figure 10: Germany's new power system



Source: own illustration; orientated at Agentur für Erneuerbare Energien (2018b); icons derived from http://www.iconarchive.com

Figure 11: Newly founded municipal utilities



Source: own illustration based on graph provided by Berlo & Wagner (2015, p. 238)

Communities are not only interested in producing energy (as lined out in sub-chapter 'Power Generation'), also the re-municipalization of electricity grids is of increasing concern (Berlo & Wagner, 2015; Rave, 2016). "According to the Union of Municipal Companies (VKU), until the end of 2012, a total of 190 municipal grid acquisitions could be counted." (Berlo & Wagner, 2015, p. 239*)[62] Again similarly to the developments in the power generation sector, the 'new' actors in the grid system introduce a different idea of economizing the grid operation (Arentsen & Bellekom, 2014; Berlo & Wagner, 2015). However, as the business model of grid operators is strongly regulated, their economic freedom is basically limited to the decision of what to do with the profit and, generally one can say, that it is rather spent to the benefit of the community than distributed among (foreign) shareholders (Arentsen & Bellekom, 2014).

Another new development, which is connected to the technical opportunities that come along with renewable energies, the digitalization of electricity grids (Agora Energiewende, n.d.), as well as the power shift towards the distribution grid level, is the sprouting idea of micro (smart) grids. Micro grids are smaller and semi-autarkic grids that balance energy generation and consumption within a city, community or only some quarters (IRENA, 2016).[63] Consequently, the locality dimension is also brought back into the grid sector (Brauner, 2016; Dannemann et al., 2016).

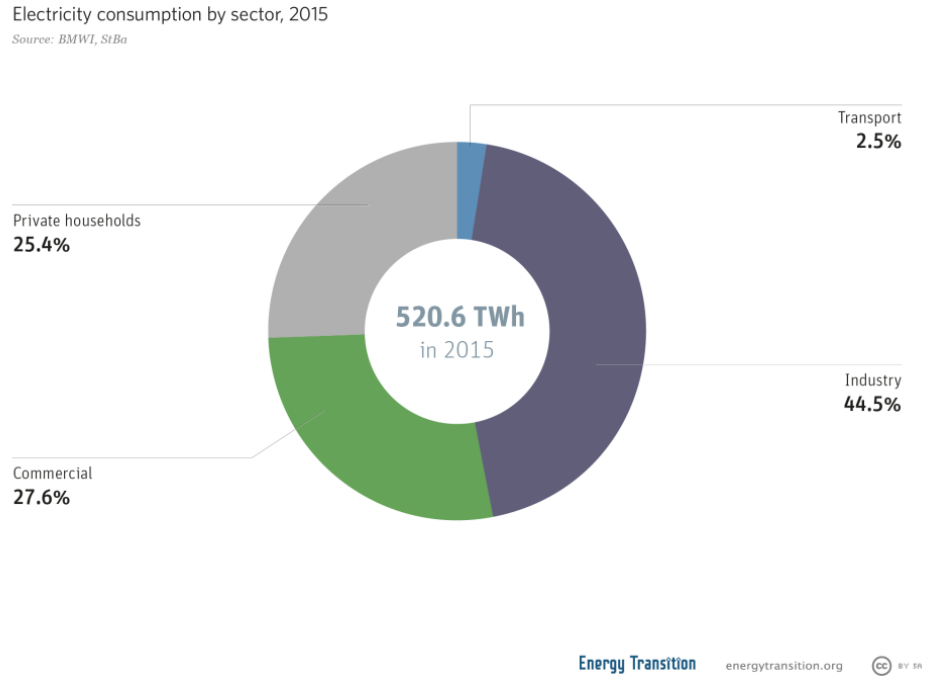
Power Consumption

In the classical centrally organized electricity system, the consumers constituted the passive end of the power supply chain. In most cases, they were connected to the distribution grid and satisfied their power demand by electricity 'coming out of the sockets' (Hermann, 2014). According to the following graph (figure 12), the most important power consumer in Germany is the industry, followed by the commercial sector and private households.

[62] Besides the power shift to the distribution level, that often coincides with community and city borders, the tendency can be explained by the wish of communities to play a more active part in the 'Energiewende' as well as due to a certain window of opportunity that was opened up by expiring concession contracts[62] between 2010 and 2016 (Berlo & Wagner, 2015).

[63] "A more advanced concept, virtual power plants (VPP), is also gaining traction in various cities. A VPP includes one or multiple micro-grids and combines this with [demand-side management] DSM and advanced control and forecasting systems (e.g. on the availability of wind) to form an integrated network, and provide a reliable overall power supply." (IRENA, 2016, p. 30)

Figure 12: Industry by far biggest power consumer in Germany



Source: Heinrich Böll Foundation (2018)

Except of big industries, which are often directly attached to the transmission grid, in many cases have their own power plants, or at least take part at the electricity stock exchange, smaller consumers such as stores or households have had very little say and influence in the power system. Until liberalization, they could not even deliberately choose their power provider themselves (Berlo & Wagner, 2015; Berlo, Wagner, & Heenen, 2017). Now, the end customers are "not only free as power consumers" (Morris & Pehnt, 2016, p. 51) but also play an important and more and more active role in the power sector (Aderhold et al., 2015), which is due to several developments.

First of all, and as mentioned before, renewables are a rather small-scale technology that can be applied decentrally. The technical preconditions in combination with the opportunities provided through the EEG – that helped smaller actors to enter the business of energy generation – has led to the effect that actors, who beforehand only took part in the energy system as consumers, started to produce energy on their own (see before sub-chapter power generation). By this means, the so far prevailing separation between power generation and consumption got dissolved and resulted in the combination of the two. This was when the terms prosumer and prosumerism were coined (Arentsen & Bellekom, 2014; Dannemann et al., 2016; Hauser et al., 2015; IRENA, 2016).[64]

[64] Since the introduction of the so called 'tenant electricity model', also tenants are enabled to benefit of this development, while beforehand only owners could, for example, install a solar panel on their roof (Morris & Pehnt, 2016).

Moreover, consumers are increasingly asked to actively participate in the stabilization of the electricity grid. In order to provide for a stable grid, power generation and demand constantly have to be balanced. In the old electricity system, the energy generation followed the demand, i.e. if there was more demand, the power plants were run up and if there was less, they were curtailed. Now, the renewables – and wind and solar energy in particular – tend to be volatile technologies whose generation is weather-reliant and, hence, cannot follow the demand (Dannemann et al., 2016; Jennes, 2012). Therefore, consumers are asked to align their demand with the power supply. So far, the so called demand-side management (DSM) (IRENA, 2016) rather applies for big consumers, such as industries and companies. However, as this is a rather new idea further development can, at this point, not be foreseen but the discovery of the field by individuals cannot be precluded.

Moreover, the awareness that the people's lifestyle has environmental consequences has gradually risen (Morris & Pehnt, 2016). Consequently, the people started to develop from "'trapped' consumers" (Berlo & Wagner, 2015, p. 245*) to conscious clients (Arentsen & Bellekom, 2014; Dannemann et al., 2016). However, change of consumption patterns goes much further than only changing to green electricity.

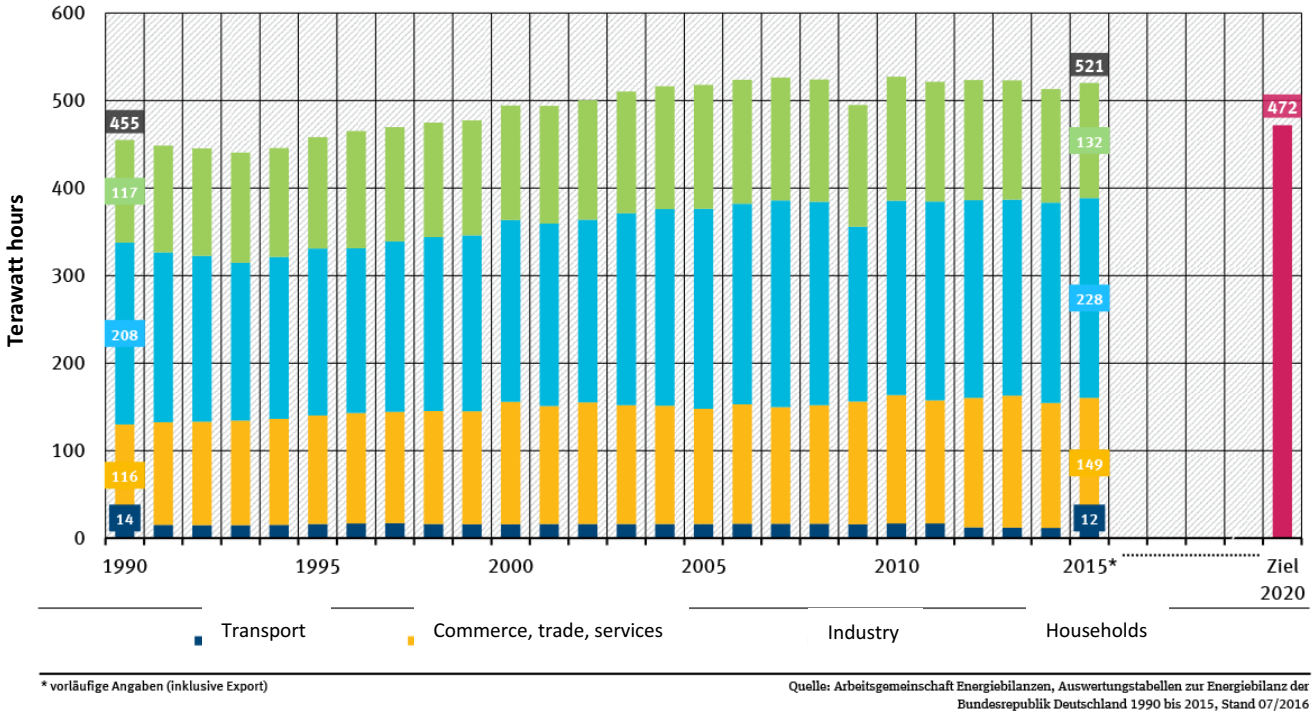
According to Brauner (2016), in Germany electricity accounts for 15 % of primary energy consumption and is thereby a not negligible column of the energy system that needs to be transformed. With 520.6 terawatt-hours (TWh), in 2015 (see figure 13), German power consumption is quite high (Brauner, 2016; Burck et al., 2014). In order to reduce this demand, policy has so far concentrated on energy efficiency measures[65]. Despite all the efforts, Germany is far from reaching the desired goal of 472 tWh in 2020 (see figure 13) and, due to electrification of other sectors, power demand is even projected to rise (Brauner, 2016).

Since this gap has got identified, attention is gradually shifting to the need for changing consumer behavior and consumption patterns in order to more effectively reduce power demand (Morris and Pehnt, 2016). Accordingly, criticism for energy efficiency – which often goes hand in hand with the green growth paradigm – is rising (Kurz, 2017; Morris & Pehnt, 2016; Unmüßig, 2015) and other solutions are being developed. One of these solutions is the application of the self-sufficiency or subsistence concept to the power sector (Kurz, 2017; Loske & Vogel, 2017; Schneidewind, 2017). Renewable energies enabled consumers to generate energy themselves. For quite some time, efforts have now been rising to make households, quarters (quarter solutions) or even whole communities

[65] e.g. through the 'Initiative Energy Efficiency' from 2002 and the 'Eco-design of Energy-using Products Act' from 2009 (Morris & Pehnt, 2016)

energy autarkic, so that the consumption equals the auto-generation of energy (Brauner, 2016; Morris & Pehnt, 2016).[66]

Figure 13: Development of German power consumption, according to sectors (as of 07/2016)



Source: AGEB (2018b); translated from German into English by the author

The other concept, that is being introduced, is the sharing idea (Kristof, 2017). The development towards community ownership and collectivity, which could be observed in the sector of power generation (see before in this chapter), can also be observed in the area of consumption. So far, German consumption patterns have rather been tending towards individualization (Schnur, 2003).67 This has of course also led to rising energy and power consumption. Now, a revival of sharing cars, rides, apartments or houses (co-housing), machines, devices, and so on can be observed (Canzler & Knie, 2017; Fuhrhop, 2017; Kristof, 2017; Loske & Vogel, 2017; Morris & Pehnt, 2016).

Both developments express the change of consumption patterns from a society that is rather growth orientated and materialistic towards a post-growth and -materialistic one (Schnur, 2003). At the end, people try to reduce their power demand – which is not anymore perceived as having negative effects on their life quality (Kurz, 2017; Loske & Vogel, 2017; Rückert-John et al., 2014; Schneidewind, 2017).

[66] However, usually consumers are still connected to the grid so that they can feed into it when they have energy surplus as well as receive power from the network system if they have a deficit (Dannemann et al., 2016).

[67] Germans possess several cars per family, almost every citizen carries a smart phone, every household has its own washing machine, and the square kilometers of living area per person have been rising constantly (Morris and Pehnt, 2016; Fuhrhop, 2017, in zukunftsfähiges Deutschland; Rohrbeck and Rohwetter, 2018, in Die ZEIT) – just to name a few examples.

Generally speaking, one can assert that the formerly central power system is experiencing both a technical but also societal decentralization process that resulted in actor diversification (Berlo & Wagner, 2015) as well as the introduction of different economic and life style concepts[68] that could broadly be summed up under the umbrella term 'post-growth' (Arentsen & Bellekom, 2014; Loske & Vogel, 2017). By this means, both production and consumption patterns (Rückert-John et al., 2014), but also ownership structures are being transformed (Berlo & Wagner, 2015). This can, on the one hand, be explained by the different characteristics and, thus, opportunities provided by renewable energies but also by changing societal values.[69]

5.2. Socio-ecological Innovations

The chapter before outlined that and how the energy transition has brought about a variety of new ideas and solutions that substantially deviate from the conventional ones. From this analysis, the following collection of alternative power initiatives could be derived[70] (see table 1). This table shall at the same time be regarded as clarifying the boundaries (see chapter II.) for the case study analysis, which will be conducted in chapter IV. In order to concretize in which way they are innovative the formerly outlined six dimensions of innovation shall be applied.

Table 1: Socio-ecological innovations in the course of German energy transition

Power Field / *Concept*	Generation	Distribution	Consumption
Do-it-yourself / Do-it-ourselves	• Prosumerism • Citizen energy projects • Re-municipalization of power generation • Energy cooperatives • Eco-energy villages and transition towns	• Citizen grids • Re-municipalization of grids • Micro (smart) grids	• Prosumerism • (Demand-side management activities) • Co-housing • Quarter solutions
Joint consumption and production	• Energy cooperatives • Eco-energy villages and transition towns • Re-municipalization of power generation with other actors having a stake	• Citizen grids • Re-municipalization of grids with other actors having a stake	• Co-housing • Quarter solutions

[68] Sharing economy, self-sufficiency, collaborative consumption and production, regional economy/localism, re-municipalization, …

[69] But also by new political framework conditions created with the EEG (Morris & Pehnt, 2016).

[70] Thereby, it shall be noted that the list does not claim to be an entirely complete nor finite inventory of potential socio-technical power innovations. For that, the current and future developments are too dynamic.

Localism	• Eco-energy villages and transition towns	• Micro (smart) grids	• Quarter solutions
Autarky/Subsistence	• Prosumerism • Eco-energy villages and transition towns	• Micro (smart) grids	• Prosumerism • Eco-energy villages and transition towns

Source: own illustration inspired by categorizations in Rückert-John et al. (2014), in combination with classifications by Wuppertal Institute (n.d.)

What is new?

Alternative power initiatives, in the sense of this paper, are projects that can be situated along-side the power value chain and tend to do things autonomously, collectively and/or locally. Looking at the table, two things get clear immediately. First, a clear separation between the sectors of power generation, distribution and consumption is not possible anymore (Dannemann et al., 2016) and, second, the alternative energy projects often apply different ideological concepts at the same time. Generated solutions are, hence, rather cross-cutting and can be characterized by combining the eco-technical innovation of renewable energies[71] with new business models, moral concepts or forms of living. Due to this novel combination of knowledge and resources in the Schumpetarian (1980) sense, alternative power initiatives can be regarded as innovations. When looking at the detected alternatives it is further striking that their novelty does not so much lie within the invention of new products, but rather in the way of organizing and commercializing electricity generation, distribution and consumption. All together this implies that alternative power projects cannot be regarded as pure technical innovations (Arentsen & Bellekom, 2014; Berlo & Wagner, 2015). Rather they are projects that fruitfully combine technical with social solutions. This paper, therefore, regards the detected alternative power initiatives (see table 1) as socio-ecological power innovations.

How novel is it?

The initiatives came up with a 'new combination of knowledge and resources' in the Schumpetarian (1980) sense. However, "[t]hey did not develop new knowledge but instead used already existing organisational [sic!] models and technologies and applied them to the" (Arentsen & Bellekom, 2014, p. 7; see also Mulgan, 2006) power system. As lined out in chapter III.5.1., before the German power system had developed into being centrally-organized, relying on large-scale technology and companies as well as following the logic of profit-maximization, it showed many characteristics that today are gradually being re-discovered. Nevertheless, those initiatives often position themselves clearly as opposition to the existing dominant power regime, question the fundamental logic of the

[71] Applied technology, thereby, tends to be rather small-scale and decentral (Hauser et al., 2015).

central system and can, therefore, still be regarded as being rather radical than incremental innovations (Arentsen & Bellekom, 2014; Rave, 2016).

For whom does it appear to be novel?

The hypothesis that the innovativeness of alternative power initiatives has so far been overlooked, particularly by policy makers, was one of the main motivations for this paper. Many authors claim that policy tends "to emphasise [sic!] the technological aspects of sociotechnical transitions, at the expense of social innovation, movements, and actors" (Seyfang & Haxeltine, 2012, p. 382). Accordingly it is being expected that the detected socio-ecological innovations are not sufficiently being acknowledged. This paper shall, therefore, contribute to spotlight the projects innovation potential.

By whom has it been triggered?

By asking for the entrepreneurs behind the innovations that were detected, it gets clear that most of the alternative power initiatives are the outcome of citizen and grass-roots activities. People, that formerly only played a role as clients in the power system are increasingly getting active and look for new ways of organizing the power system (Arentsen & Bellekom, 2014; Rückert-John et al., 2014; Seyfang & Haxeltine, 2012; Seyfang & Smith, 2007). However, in general one can say that the power system experienced actor diversification, that besides citizens includes new actor networks, companies and municipal enterprises coming up with innovative solutions (Berlo & Wagner, 2015; Grießhammer & Brohmann, 2015).

Processual stage in which they are situated?

The processual stage in which the projects are situated differs substantially from kind to kind. While concepts such as eco-villages, energy cooperatives, co-housing and prosumerism are already quite established and being reproduced all over Germany, micro-smart grids, quarter solutions and demand-side management potentials are just being discovered and implemented. However, in general one can say that due to their small-scale character and the prevalent focus on community gain instead of profit-maximization, up-scaling of projects is usually not in the meaning of alternative power initiatives (Seyfang & Smith, 2007).

Normativity Gains

In chapter III.2 the supposed target system of cities was derived by looking at the goals for sustainable city development, provided in the 'New Urban Agenda' (Habitat III Secretariat, 2017). In this sub-chapter, the potential contribution of the previously carved out alternative power initiatives shall be analyzed theoretically, before being tested in form of case study analyses (chapter IV.1-3.).

Reduce Poverty and Increase overall Living Standard

In general, the living standard[72] in Germany is pretty high. "In comparison to other countries, included in the Better Life Index, Germany scores well in in many indicators of life quality." (OECD Better Life Index, n.d.*) Household net income (33,652 US-$) per year is higher than in the OECD average (30,563 US-$), household net wealth is just below (OECD Better Life Index, n.d.), and Germany's economic power in total is increasing steadily – even after financial crisis (Statista, 2018b).

Yet, poverty is not an absent issue in Germany. "The poverty rate reached 15.7%. In calculational terms this implies that in 2015 about 12.9 million people in Germany lived beneath the income poverty threshold." (Der Paritätische Gesamtverband, 2017, p. 9*) In 2016, this rate had already reached 19.7%, which means that 16 million people were living under poor conditions (Destatis, 2018).[73] More often, poverty rates in cities tend to be even higher (Der Paritätische Gesamtverband, 2017; Schnur, 2003).

In this context, the global issue of energy poverty is usually brought up. Access to electricity is seen as necessary precondition "in order to create income sources, to achieve health objectives, and to enable education" (Beuermann, 2014, p. 36). Albeit the access to electricity is not a problem in Germany – the access to electricity rate is 100% (The World Bank, 2018) – energy poverty[74] is an increasingly discussed topic in the republic (see Bra, 2017; Meier, n.d.). According to Bulling-Schröter, "energy poverty is a silent catastrophe for millions of people in Germany" (Bra, 2017*). In Germany, the discussion about energy poverty is closely connected to the problem of rising energy prices. Within ten years, the electricity price has risen from 18.7 cents per kWh, in 2006, to 28.7 cents per kWh in 2016 (Heidjann, 2018) – an increase of 35%. This has several reasons – due to the diverse components of the electricity costs[75] – which shall however not be discussed in this paper. As a matter of fact, for some people, rising power costs are not affordable anymore – in 2015, power cut-offs amounted to 331,000 per year – and are getting a threat, leading to encumbrance and even the possibility to lose their homes. "As one of the most important triggers of losing someone's home, debts in rents and energy are being mentioned (18 per cent in 2015)" (Bra, 2017*). Moreover, low-income households – like people receiving Hartz IV[76] – are particularly affected by energy poverty. "[O]n average, they spend a higher portion of their income on energy needs and

[72] In development terms, energy and access to electricity play a pivotal role (IRENA, 2016; World Economic Forum, 2016). As Hermwille stated: "Without access to electricity, development is limited. It seems hardly possible to overcome a certain development threshold without access to electricity." (2014, p. 42)

[73] Although the GDP of Germany has been rising constantly, poverty rates have not been shrinking accordingly. Ever less people are benefitting from the rising wealth of Germany. This implies that the issue of socio-economic inequality is increasingly getting a problem (Der Paritätische Gesamtverband, 2017). The issue of inequality shall be discussed later in this chapter.

[74] "[In Germany] [w]e talk about energy poverty, when low-income persons cannot afford electricity and heat to an appropriate extent." (Meier, n.d.*)

[75] see https://www.stromauskunft.de/strompreise/strompreis-zusammensetzung/

[76] German social service for unemployed people

are the least likely to be able to afford investments in energy efficiency such as energy renovations, efficient appliances, and fuel-efficient vehicles" (Morris & Pehnt, 2016, p. 18).

Hence, poverty is an issue that correlates with energy provision and could thereby be potentially tackled by power initiatives. The most obvious leverage lies within do-it-yourself-projects. Initiatives that generate electricity themselves have direct control over tariffs (IRENA, 2016), and as they rather tend to follow the principle of community-gain instead of maximization of return, the absence of profit margins could result in more socially acceptable prices (Interview 3).[77] Other potential rests within the idea of prosumption. People who provide themselves with their own energy, e.g. from the roof, obtain less energy from the grid and, thus, have lower power bills – additionally, they can sell their surpluses on the market and, thereby, even generate profit (Morris and Pehnt, 2016).[78] The same effect accounts for initiatives that aim at reducing power demand by joint consumption and/or the application of energy efficiency[79] measures (Interview 2). Thereby, co-housing initiatives usually exert the adding effect that they tend to demand lower rents, as size of individual living area is being reduced and substituted by bigger community-areas – or due to other cost-saving effects.[80]

In general, joint consumption and production projects can be, due to their family- or neighborhood-like structure, considered as valuable networks of support. In the context, one often talks about social capital.

> "Social capital is a particularly fruitful quality of social networks that lies within the relation of several individuals. Thereby the networks are [...] being enabled and stabilized by trust. Moreover, the existence of the norm of reciprocity is a necessary precondition for the emergence and maintenance of this resource. [...] The networks themselves facilitate actions, which provide benefit for individuals or collectives. Only in this benefit they constitute social capital in terms of a resource." (Schnur, 2003, p. 43*)

By collectivizing human capital, information and capacities, the group in total is being empowered to solve problems together and, therefore, better protected against risks (Interview 2) (Schnur, 2003) – such as poverty.[81]

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[77] Also other cost-saving effects could be decisive. This shall be looked at in more detail in the sub-chapter of 'promoting inclusive economic growth'.

[78] However, low-income households do, so far, not profit so much from the opportunities provided by decentral energy technologies as, individually, they can usually not leverage the investment needed (Hauser et al., 2015), or were so far excluded as they are mostly renters and not owners of the houses and apartments they live in (Morris & Pehnt, 2016). The latter condition might be changing now, with the introduction of the tenant electricity model and also the do-it-together philosophy provides interesting entry points as we will see.

[79] Here, also the concept of municipal power utilities – that stand out due to their close relation to the customers – can exert certain leverage by providing consulting in energy efficiency management (Berlo & Wagner, 2015; Berlo, Wagner, Drissen, et al., 2017)(see lnterview 3). Thereby, it shall be noted that the issue of energy poverty is usually being aggravated by the fact that affected people can accordingly not afford energy-efficient devices. Hence, knowledge consulting in how to optimally change consumption patterns is crucial.

[80] Therefore, housing projects tackle the issue of affordable living in general (Interview 2).

[81] Thereby, housing projects, in particular, often go further by integrating neighborhood centers, youth centers or kind of social and neighborhood work (Interview 2; Interview 3).

Thus, social capital is getting of even higher importance in situations where public supply of goods, services and a certain living standard is failing. However, this can only assist (Schur, 2003) but should not substitute cities in their function as providers of welfare (Schnur, 2003; Seyfang & Smith, 2007).

Increase Human Health and Well-Being

Talking about health issues, one probably immediately has to think of coal power plants that, besides their negative climate effect, also affect air quality and thereby human health (Greenpeace, 2013; OECD Better Life Index, n.d.).[82] Moreover, the intrinsic health hazard of nuclear power plants is obvious (see Morris & Pehnt, 2016). Renewable energies, here, constitute a much cleaner and safer technology (IRENA, 2016). However, as these benefits are a direct attribute of the technology itself and not of its social or organizational embeddedness, it is not going to be considered as particularly positive effect of alternative power initiatives in the scope of this paper and, hence, it shall rather be focused on potential well-being effects.

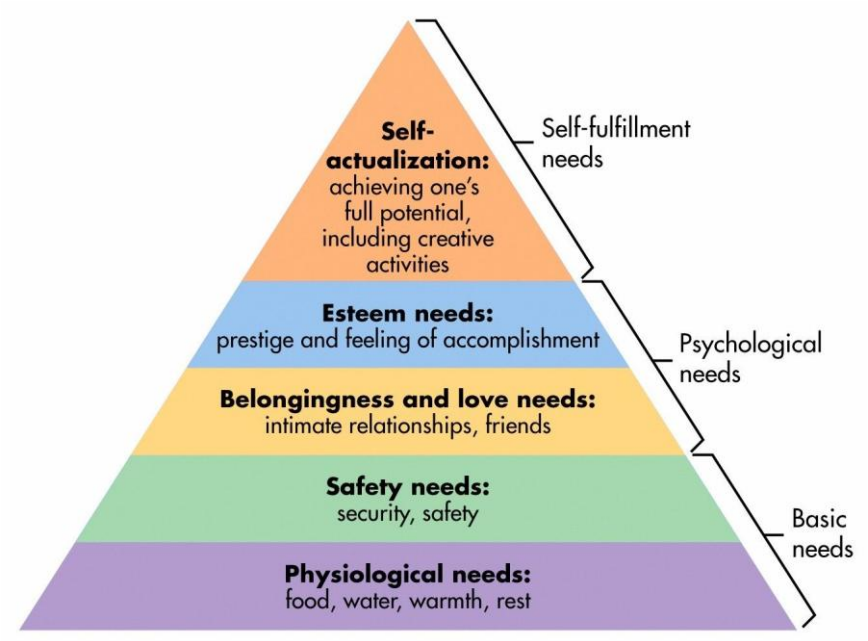
Generally speaking, Germans seem to have a relative high level of well-being. "At a scale, ranging from 0 to 10, they assess their life satisfaction with 7.0. The OECD average lies at 6.5." (OECD Better Life Index, n.d.*) As well-being is a much more personal and subjective dimension than health or living standard, it is hard to draw general conclusions on its development. However, studies have revealed a change of values from materialism to post-materialism, which increasingly makes the satisfaction of non-material needs of crucial importance for the enhancement of people's well-being (Schnur, 2003). This provides a first entry point, as the detected alternatives often rather aim at improving life quality overall than contributing to material wealth or even economic growth (Seyfang & Haxeltine, 2012; Seyfang & Smith, 2007). Also when using and looking at Maslaw's hierarchy of needs (figure 14), several potentially positive well-being effects can be detected.

Starting at the levels of safety needs and belongingness and love needs, one could say that the cooperative and community dimension (Mulgan, 2006; Rückert-John et al., 2014) of many of the detected power alternatives can have several positive effects. By working together, e. g. in cooperatives or neighborhood projects, people obviously experience social contact, potentially build up friendships and develop a "sense of community" (Seyfang & Smith, 2007, p. 593)(Arentsen & Bellekom, 2014; Mulgan, 2006; Schnur, 2003; Seyfang & Haxeltine, 2012)(Interview 2) – one of the basic human desires. The need for social contacts is getting of particular importance in big cities, where the higher degree of anonymity can lead to

[82] "In Germany, the PM2.5-concentration is 14.0 microgram per cubic meter and, therefore, above the OECD average of 13.9 µg/m3 as well as above the recommended yearly air quality benchmark of 10 µg/m3, as set by the World Health Organization" (OECD Better Life Index, n.d.*). This problem is, however, rather originated in the mobility sector and, therefore, it is not assumed that the observed power alternatives can exert influence on that.

the feeling of isolation and loneliness (Aderhold et al., 2015; Schnur, 2003). However, the community dimension can exert further positive implications.

Figure 14: Maslaw's hierarchy of needs



Source: McLeod (2017)

Firstly, in community-based initiatives the norm of reciprocity often plays a pivotal role. When positive experiences with this norm can be conveyed, social trust is being build up or recovered (Schnur, 2003; WECF, 2016). Thereby, trust is a valuable component for enhancing the feeling of safety. Secondly, community-based activities can act as an "anchor against the tendency of deterritorialization" (Schnur, 2003, p. 19*). In a surrounding characterized by "cultural uprooting" (Aderhold et al., 2015, p. 71), community enables identification with the local (Arentsen & Bellekom, 2014; Rückert-John et al., 2014; Schnur, 2003; Seyfang & Haxeltine, 2012), which in turn positively affects the feeling of safety and belongingness.

Other well-being potentials rest within the factor of civic engagement that many of the identified power alternatives share (Röbke, 2013; Rückert-John et al., 2014; Seyfang & Smith, 2007; Vogel, 2013). Some people seem to have a strong desire to get active or participate, to take responsibility and to be of use or help for society (Röbke, 2013; Schnur, 2003; Seyfang & Smith, 2007)(Interview 6). The detected initiatives provide plenty of opportunities to do so. The underlying motivation for the wish to get active might be the desire for social acknowledgement and reward (Hauser et al., 2015; Schnur, 2003). Also the wish for self-fulfillment might be an underlying factor (Röbke, 2013; Vogel, 2013). The power alternatives potentially provide room for personal unfolding and growth (Aderhold et al., 2015; Seyfang & Haxeltine, 2012).[83] People can try out new ideas,

[83] Due to the principle 'everyone according to their wishes and capacities', all people is being enabled to contribute and develop. This also inherits an integrative dimension (Interview 6).

concepts as well as their own capacities and skills. This is being fostered by a community that shares knowledge and information within its members and educates itself (social learning, see Kaphengst & Velten, 2014; WECF, 2016)(Interview 6). The experience of someone's own capacity[84] to create, shape or change something (Hauser et al., 2015; Schnur, 2003; Vogel, 2013) can lead to a feeling of self-efficacy and -actualization (Hauser et al., 2015; Rückert-John et al., 2014; Schnur, 2003) and positively influence a person's self-esteem (Seyfang & Haxeltine, 2012 see also sub-chapter empowerment of women and girls).

Hence, well-being potentials of alternative energy projects mainly lies within its characteristic of 'doing things collectively'. However, also the factor 'active participation' provides entry point.

Reduce Inequalities and Foster Social Cohesion

In direct terms, the dimension targets the provision of equal rights and opportunities to all citizens. However, it also goes further and pictures cities that are integrative and inclusive. The equal participation of all people shall be fostered and social segregation prevented. The dimension therefore asks for the way in which certain vulnerable groups – women, children and youth, older and disabled people, low-income groups, displaced and homeless people, refugees and migrants, disaster- and crisis-affected persons, indigenous and local people (see Habitat III Secretariat, 2017) – are integrated in urban society.

In the context of German energy transition, discussions have been rising about how to organize the transition in a more socially inclusive way ('just transition'[85]). Over the years and decades of German energy transition, it has got clear that the transformation does not only bring about winners. Thereby, the group of workers and employees in the coal mining areas of Germany, whose livelihood basis is being jeopardized, has got increasingly into focus. Hence, discussions about 'just transition' have been rotating around the question of what to do with this certainly vulnerable group. In this context, the transformation is rather being perceived as a challenge for a just, equal and inclusive society (Hermwille, 2017; S. Smith, 2017). In comparison, potential benefits do not seem to be well understood, yet. Here, alternative power initiatives come in and provide several entry points for enhancing equality and social cohesion.

One opportunity lies within the organizational form of energy cooperatives or community-living projects. There, decisions are usually made in plenum – and often in consensus –, where each member of the cooperative has an equal say (Hauser et al., 2015)(Interview 6).[86] Equality thereby constitutes a basic principle of the self-image.

[84] Competency gains are rarely limited to energy-related knowledge, but also comprise the development of organizational and social skills (Hauser et al., 2015)(Hauser et al., 2015).
[85] see Smith (2017)
[86] This further fosters social-learning about how democracy works and, thereby, also empowers people to take part in democratic processes even outside of the initiative itself (Interview 6).

Moreover, many of the above-mentioned initiatives have an inherently integrative and inclusive character, as they actively empower and encourage citizens to take part in the energy system – as inhabitants, consumers, prosumers, entrepreneurs (Hauser et al., 2015; IRENA, 2016; Seyfang & Haxeltine, 2012; Seyfang & Smith, 2007). The decentralization of the energy system has, as shown in chapter III.5.2, led to a de-monopolization and accordingly to a democratization[87] of the power economy, which opens up opportunities for participation to a diverse[88] range of actors (Hauser et al., 2015; Morris & Pehnt, 2016; WECF, 2016).[89] Within the integrative initiatives, especially housing projects often combine the idea of joint-consumption with concepts such as multigenerational or intercultural living, or try to actively include disabled people or economically disadvantaged persons in their community (Aderhold et al., 2015; Schnur, 2003)(Interview 2, 3 and 6).[90]

As already mentioned in the elaborations on 'poverty reduction', In Germany, socio-economic inequality is an increasing problem, as ever less people seem to profit from a constantly rising GDP (Der Paritätische Gesamtverband, 2017; OECD Better Life Index, n.d.). In this regard, researchers like Rückert-John et al. (2014) attribute a particular chance to joint power projects for alleviating this problem. Grouped in cooperatives, flat shares, quarters or neighborhoods, financial capabilities are being pooled and, thereby, more profound investments with lower individual liabilities can be leveraged (Hauser et al., 2015; Morris & Pehnt, 2016; Schnur, 2003)(Interview 2).

> "It is often said that only the wealthy can make such investments; for instance, critics charge that you need to own your own home to have a solar roof. But more than 90 percent of Germany's energy cooperatives have already set up solar arrays, and a single share in such cooperatives costs less than 500 euros in two thirds of the cooperatives – with the minimum amount less than 100 euros in some cases." (Morris & Pehnt, 2016, p. 56)

Hence, alternative power initiatives possess several characteristics that provide entry points to foster equal participation and social cohesion.[91]

[87] Thereby not only capital expenditure is being increasingly splintered, but also the resulting profits are shared more broadly (Hauser et al., 2015).

[88] Fostering diversity is of particular importance to city development, as resident population in quarters is usually quite homogenous, which is leading to social segregation – catchword 'ghettoization' - but also demographic problems, if for example whole city districts are over-ageing (Schnur, 2003).

[89] Thereby not only capital expenditure is being increasingly splintered, but respectively also the resulting profits are shared more broadly (Hauser et al., 2015).

[90] For instance, via neighborhood centers, repair cafés, youth centers (Interview 2, 3 and 6).

[91] However, the question stays whether alternative power initiatives manage to activate and integrate certain vulnerable groups in practice. In this regard, studies have revealed that even these fundamentally integrative initiatives have problems in encouraging certain groups. For example, people engaging in that kind of projects tend to have a rather high-level of education, which often means that low-income groups are not as frequently represented (Schnur, 2003; Seyfang & Haxeltine, 2012)(Interview 2 and 6).

Empower Women and Girls

In the next step, the initiatives potential to reduce gender inequalities and to empower women and girls shall be looked at in more detail. Inequalities between men and women utter in many ways, but are especially getting visible in the percentage of women employed compared to men (especially regarding higher positions) and in the differences in payment. In 2016, 46.5 out of 100 women were employed in Germany. Compared to their proportion in society as a whole (50.8%), this implies that women are still underrepresented in work life. The imbalance gets even more striking, when looking at women in leading positions. In 2016, only 29.3% of executive managers were female. Also, differences in payment are prevalent. The medium gross income per hour of women in 2016 was in average 21% lower than the one of men – this is also much higher than the EU average of 16% (Destatis, 2018; see also OECD Better Life Index, n.d.).

As lined out in the sub-chapter before, due to their integrative and basis-democratic approach, some of the detected power initiatives provide the potential to contribute to the enhancement of equal participation of women and men (WECF, 2016). However, power provision, distribution and consumption, on the first sight, seem to be quite technical topics and might, therefore, still be rather manly attributed. Thus, if not encouraged actively, a majority of women might refrain from taking part, sticking to conventional gender roles (Schnur, 2003)(Interview 2).[92]

In the sub-chapter of 'increasing health and well-being', the correlation of civic engagement with a feeling of self-efficacy and -fulfillment was being illustrated. "Self-efficacy [...] means the positive personal assessment of someone's own capacities and the expectation that self-initiated action leads to anticipated and requested consequences." (Hauser et al., 2015, p. 30*) This feeling might not only enhance someone's personal well-being but, moreover, substantially contributes to a person's empowerment (IRENA, 2016; Seyfang & Haxeltine, 2012; Seyfang & Smith, 2007) and lays the foundation for the development of further civic engagement and participation in public life[93] (Hauser et al., 2015; Seyfang & Smith, 2007)(Interview 6). Accordingly, power initiatives that build on the 'do-it-yourself'-principle could also potentially be used as leverage to empower women and girls. However, here researchers like Hauser et al. (2015) point out that people engaging in energy cooperatives, for instance, tend to have been rather engaged already before. Hence, in order to motivate for initial engagement, certain encouraging strategies and – in the particular case of

[92] However, thereby it is also being mentioned that women engage more strongly in housing projects (Interview 2). This could also be an entry point.

[93] Participation in public life is generally being perceived as necessary precondition for a vivid and functioning democracy (Hauser et al., 2015; Schnur, 2003).

empowering women – a gender sensitive management of the power initiative might be necessary (WECF, 2016).[94]

Promote Inclusive Economic Growth

At latest since the study of the German institute for economic research (DIW) in 2010, renewable energies are regarded as a driver of economic growth in Germany (DIW Berlin, 2010).[95] They are expected to create value und jobs[96] (IRENA, 2016) and to help Germany to "position itself as an exporter of green technology" (Morris & Pehnt, 2016, p. 11). Additionally to boosting the economy, renewable energy also has a cost reduction impact on the German economy (World Economic Forum, 2016). "The German Environmental Ministry estimates that renewable energies offset 9.1 billion euros in energy imports in 2013 alone." (Morris & Pehnt, 2016, p. 9f) Besides, also energy efficiency efforts lead to national-economic cost saving effects.

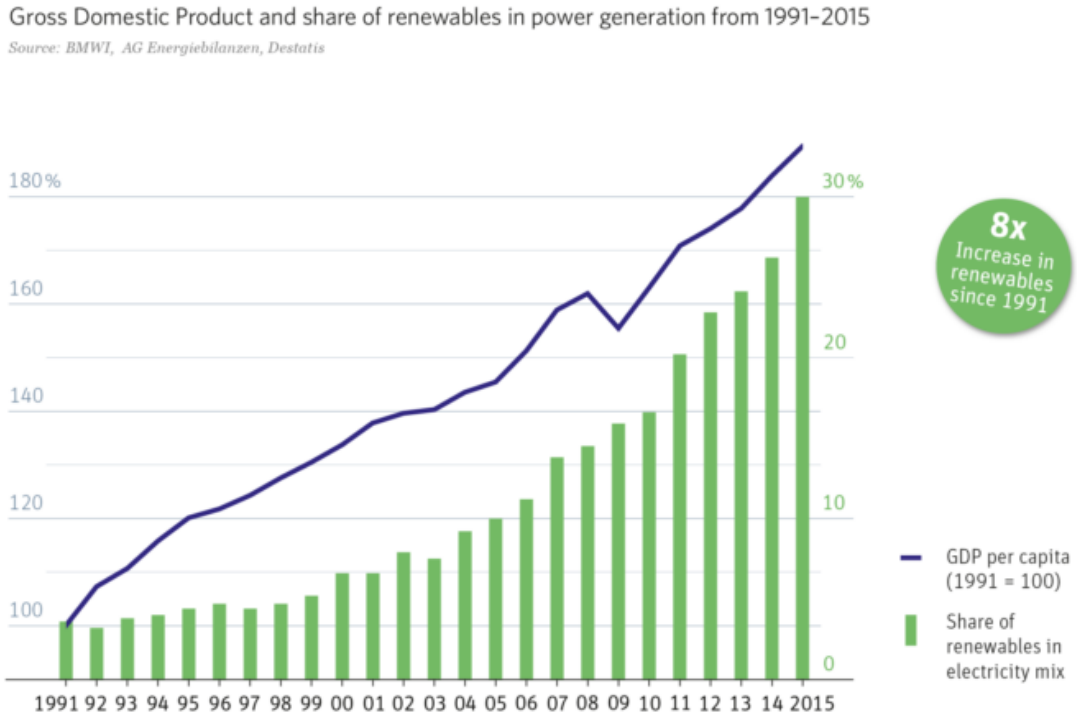
However, when discussing about the positive economic effects, people tend to refer to huge and centrally organized wind farms as well as big companies such as 'Siemens', who develop and export renewable technology, instead of the smaller-scale projects looked at in this paper. This is due to several reasons.

[94] Here, it shall be mentioned that organizations such as Women in Europe for a Common Future (WECF) already use the idea of energy cooperatives as an instrument to empower women in Georgia, Ukraine, Moldovia and Armenia (see WECF, 2016)

[95] „The roll-out of renewable energies triggers effects on the value creation in Germany, whereat also technologies, which build on fossil fuels, are being replaced, which exerts likewise impact on value creation. Consequently, the positive gross effects of an expansion of renewables on value creation and employment have to face further negative effects triggered by the recession of fossil generation." (Hauser et al., 2015, p. 54*) Still, the DIW calculated an overall positive effect on the German economy, which is mainly due to the fact that renewable power is first replacing nuclear power, a sector in which only very little people work (Morris & Pehnt, 2016). When looking at regions or cities, the conclusions can, however, deviate substantially (Hauser et al., 2015). The effects on the Lausitz, for instance, could be overall negative, if proactive political efforts to develop the region are missing.

[96] "In Germany, roughly 355,000 people already worked in the renewables sector in 2014 […]. In 2015, the German Ministry for Energy and Economic Affairs estimated that the net number of additional jobs brought about by renewables would reach 100,000 by the year 2030 and 230,000 by 2050." (Morris & Pehnt, 2016, p. 12)

Figure 15: Renewables do not hurt Germany's economy



Source: Morris & Pehnt (2016, p. 11)

Most of the alternative power initiatives are orientated towards community gain or public value (Arentsen & Bellekom, 2014; Hauser et al., 2015)(Interview 3). Sustained economic growth and profit maximization, therefore, can rarely be regarded as their guiding principles. Moreover, they are rather small-scale business projects (Seyfang & Smith, 2007), which is why they are often overlooked in a market that is orientating towards economy of scale (Interview 4).

Still, return assumptions play a motivating role for citizens or municipalities, when deciding to invest in power projects. They might be lower than provided by comparably professional financial investors, but tend to be rather stable (Hauser et al., 2015). Thereby, grid operation, in particular, is increasingly getting attention, as this is the area where – due to the national regulation policy – returns are fixed and comparably high (Bundesnetzagentur, 2018; Kreutzfeldt, 2016).[97]

In general, one can also state that alternative projects do at least not negatively affect economic development of a city, as they are mostly "economically viable and robust against macroeconomic instabilities" (WECF, 2016, p. 19).[98] This is due to several advantages that result in comparably lower expenditures (Hauser et al., 2015; Hopkins, 2010). One big factor, here, is inferior transaction costs. First and especially in citizen

[97] This does, however, not account for micro (smart) grids.
[98] Especially as, since the early phase of trial and error, citizen energy has experienced a continuous intensification and increase of quality (Hauser et al., 2015).

energy, a lot of work[99] is provided voluntarily or not quantified exactly, so that the respective working hours stay unpaid and are, consequently, not integrated in cost calculations.[100] Second, some expenditures do just not occur. For instance, often costs for searching suitable plots for power facilities lapse, when the initiatives take their own lands or roofs; and even if they do not have their own plot, they can benefit from regional know-how[101] – compared to foreign investors (Hauser et al., 2015). This particularly applies to municipal enterprises (Berlo, Wagner, Drissen, et al., 2017; Rave, 2016). The locality of the initiatives brings about another positive economic effect. If investors are not anonymous or known in the region, acceptance of local population regarding the investment project is higher. Plans are, therefore, more likely to be approved and implemented and, hence, investments are less risky (Hauser et al., 2015; Hopkins, 2010; Morris & Pehnt, 2016; Rave, 2016). Also, the norm of reciprocity and exchange can reduce expenditures substantially – this is rather an attribute of citizen initiatives (Hauser et al., 2015; Schnur, 2003). Eventually, certain attention shall again be directed towards grid projects. Local grid projects exert the effect that, both, costs for using pre-located grids as well as costs resulting from energy losses are being reduced as transport distances shrink (World Economic Forum, 2016).

Furthermore, positive effects on employment can be expected. Hauser et al. (2015) even attempted to calculate the impact of citizen energy on job creation and concluded with a total ranging between 65,000 and 114,000 fulltime equivalents, which implies a contribution ranging between 39 to 69% to overall renewable job creation. The effect on employment can therefore be regarded as substantial (Hauser et al, 2015; Seyfang and Smith, 2007; WECF, 2016).[102] Hauser et al. (2015) further mention that these employments tend to be more long-term and safe, which makes them comparably decent.[103]

At this point one clear positive advantage shall be highlighted, which also sharply distinguishes alternative projects from conventional solutions. As many of the initiatives detected in this paper have locality as a core issue, local value generation is being stimulated (Beuermann, 2014; Hauser et al., 2015; WECF, 2016; World Economic Forum, 2016). Local value generation

[99] For instance, information collection (what is the right technology, who is the best plumber, …), preparation cost estimations, administrative work (acquisition of permissions, etc.), maintenance; but also educative work and training are often provided internally by the group (Hauser et al., 2015). In the segment of housing projects one often speaks of the so called “muscle mortgage” (Interview 2, p. 9).

[100] Hauser et al., (2015) estimated that these ‘donated working hours’ can reach a value equivalent of several thousand euros per year and conclude: “The smaller the facility, the more unfavorable the relation of transaction to investment costs would be in the investment calculation of a professional investor.” (Hauser et al., 2015, p. 42)

[101] e.g. knowledge about wind regime, about ownership settings, important local stakeholders, … (Hauser et al., 2015)

[102] This, however, does rather apply to projects operating in power generation and transmission and e.g. rarely to housing projects (Interview 2).

[103] However, the above mentioned factor that plenty of working hours often remain unpaid thwarts the effect.

exists of three components, namely profits being generated as well as the taxes being paid[104] locally by the companies, but also local jobs that are created[105] and that provide the local population with income as well as craftsmen with jobs (Hauser et al., 2015; Hopkins, 2010; IRENA, 2016) (Interview 2 and 4).[106] Although numbering this effect is rather difficult, Hauser et al., (2015) refer to the Institute for Eco-economic Research (IÖW) who calculated that, in 2012, renewable energies had amounted in a value creation of 16.9 billion euros, of which 3.2 till 5.3 billion could be attributed to regional value creation by citizen energy projects (Hauser et al., 2015). Estimations of the German Agency for Renewable Energies (AEE) are even higher, speaking of a municipal value generation of 10.5 billion euros in 2010, of which 9.2 billion euros where generated in the power sector (Agentur für Erneuerbare Energien, n.d.).[107] In a more descriptive way, the example of a local food network, given by Hopkins (2010), clarifies the effect that the local economy approach brings with it.

> He states that "£10 spent with a local grower circulated two and a half times locally, being worth £25 to the local economy, whereas the same money spent in a supermarket left the community much quicker, with a multiplier of just 1.4, being worth just £14" (Hopkins, 2010, p. 160).

A similar multiplication effect can be attributed to local power activities – although actual multiplying factors can differ. Crucial to this multiplication effect is that the money circulates locally instead of leaving the city or community – which often is the case with supra-regional or even multinational companies, and stock corporations in particular (Hauser et al., 2015; Hopkins, 2010; Morris & Pehnt, 2016). Reducing this "added value flow outside of the local region" (Arentsen & Bellekom, 2014, p. 3) often is a key goal of the local initiatives. Hence, "[l]ocal ownership of renewables provides great economic payback to investing communities" (Morris & Pehnt, 2016, p. 17). Locally operating power initiatives can be a sound income base for municipalities, especially due to the taxes they pay[108]. An even more direct effect is exerted, if municipal companies are active in the power sector and their profits are – via ownership structures – directly translated into public budget (Berlo, Wagner, Drissen, et al., 2017; Hauser et al., 2015; Morris & Pehnt, 2016).[109]

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[104] especially income taxes and business taxes (Hauser et al., 2015)

[105] The factor of local job creation is getting of particular importance in cities that suffer from depopulation and emigration (Hauser et al., 2015).

[106] Thereby, the expert of the trias foundation sees that housing projects and quarter solutions can particularly kick-start development in districts, as they bring in certain traffic that tends to trigger further projects (Interview 2).

[107] To provide the municipal decision makers with a first impression of potential local value creation effect, the AEE has even developed a tool to calculate the value creation effect of a specific facility, technology or of a whole park, see http://www.kommunal-erneuerbar.de/de/kommunale-wertschoepfung/rechner.html.

[108] but also due to leasing receipts for land that they provided to the power initiatives (Hauser et al., 2015)

[109] "For many regions and municipalities the earnings generated by investments in and operation of renewable energies, thus, constitutes a not insignificant source of income." (Hauser et al., 2015, p. 81*) At the end this brings about cross-subsidization, as generated profits are translated into local

According to Arentsen and Bellekom (2014), besides the reduction of the local added value outside of the community (see above), the enhancement of community gain is of certain importance. Solutions shall "respond to the local situation and the interests and values of the communities involved" (Seyfang and Smith, 2007, 585). This is why, besides municipal utilities, also private alternative power initiatives tend to reinvest their gains locally or even to promote other environmental or social projects (Arentsen & Bellekom, 2014; Hauser et al., 2015; Morris & Pehnt, 2016).[110]

By all these means, the people can not only actively participate in the power sector but further benefit from the profits generated in a more inclusive way – not only due to generating and selling power themselves, but also indirectly due to the above described effects on local value creation (Hauser et al., 2015) (Interview 3).[111]

Foster Resilience

In order to foster resilience, both, the vulnerability of people needs to be reduced as well as their adaptive capacity enhanced so that they can withstand shock and crises (Habitat III Secretariat, 2017)(see also Interview 3). This can, on the one hand, be reached by empowering people but, on the other hand, by eliminating the risks that the people are exposed to.

Looking at the risk side it gets clear that there are several risks inherent to the conventional power system. The most obvious one lies within nuclear power.[112] Also, the conventional system is very reliant on fossil resources[113] that mainly need to be imported, which leads to a high dependency on trade relations but also price fluctuations (see Berlo, Wagner, Drissen, et al., 2017; Morris & Pehnt, 2016). With a shift towards renewable energies and energy efficiency, fossil fuel and import dependency can certainly be reduced and, thus, resilience enhanced (Berlo, Wagner, Drissen, et al., 2017; Morris & Pehnt, 2016; WECF, 2016). However, failed projects such as Desertec demonstrated that a sheer substitution of energy resource cannot solve the problem (Morris & Pehnt, 2016). "The more energy a country gets from within its own borders, the less vulnerable it is to […] [e.g.] political disruptions" (Morris & Pehnt, 2016, 15). The alternative power initiatives, however, often go further by trying to "gain as much control over […] [their] own affairs as possible" (Hopkins, 2010, p. 78) or to be as autonomous as they can be (Arentsen & Bellekom, 2014). By providing themselves with their own energy or locally balancing demand and supply, their general

investments, e.g. in infrastructure such as schools, public transport or others (Morris & Pehnt, 2016). Thereby, local population benefits collectively (Hopkins, 2010).

[110] This particularly accounts for cooperatives, whose legal status urges them to create value for the benefit of the members (Interview 3 and 6).

[111] However, the integration of tenants in the electricity market still rather constitutes a challenge (Interview 4).

[112] As the risk can be reduced by shifting to renewable energies in general and not so much by alternative energy projects in particular, it shall not be dived in deeper at this point.

[113] "Germany imports about two thirds of its energy." (Morris & Pehnt, 2016, p. 9)

independence, and thus resilience, is substantially being enhanced (Arentsen & Bellekom, 2014; IRENA, 2016; Morris & Pehnt, 2016).[114]

Another power-related issue is the question of energy security (WECF, 2016). Since substantial progress in energy transition has been made, the question of energy security in Germany is increasingly being attributed to grid stability. In order to uphold grid stability, the amount of energy produced and consumed constantly need to be in balance. With the shift towards renewable energies, this is increasingly getting a challenge, as technologies such as wind and solar power are very volatile and dependent on weather conditions.[115] One way to counteract this rising instability, is enhancing the power system's flexibility by holding available dispatchable power facilities (Morris and Pehnt, 2016), introducing storage technologies and applying new solutions such as virtual power plants and demand-side management (IRENA, 2016). Another solution lies within the diversification and decentralization of power supply. The more diverse the technology mix and the more distributed the power generation, the less the overall system is being affected if one certain condition, such as wind intensity, changes. However, due to their orientation towards profit maximization, conventional companies tend to invest in the most cost-efficient variant, e.g. a large-scale on-shore wind park in Brandenburg. Certainly, in this case, changing weather conditions are substantially being felt by the grid whilst a portfolio of several small-scale projects with application of different technologies couldn't exert the same effect. Certain attention shall further be directed to local smart and semi-autarkic grid solutions. In the case of a blackout, these grids can serve as islands "isolating the event and reducing outages across the city" (World Economic Forum, 2016, p. 20).[116]

Looking at the other entry point to enhancing resilience, the two central potentials have already been mentioned before. First, that alternative power projects possess certain leverage on empowering people. Moreover, that the cooperative and community-like organization approach can result in strong networks that, in case of an emergency, provide mutual support (Schnur, 2003) (Interview 2). By this means, effects on individuals can be alleviated, which enhances the overall resilience of the group.

[114] Thereby it doesn't only increase their independence from finite resources and energy imports, but also from fluctuating energy prices and the stranglehold of large companies. The more the ownership of the power supply is being diversified, the better oligopolistic structures can be broken down and consequently democratized, and the less market power the 'Big Four' can exert (Berlo, Wagner, & Heenen, 2017; Morris & Pehnt, 2016; WECF, 2016)(see also Interview 3).

[115] Furthermore, the bidirectionality constitutes a challenge that needs to be managed (Dannemann et al., 2016).

[116] Also, even in the case of a blackout, it is easier to restart small-scale facilities and grid structures than if a single large-scale plant needs to ramp up whole grid regions (World Economic Forum, 2016).

Protect and Restore Ecosystems and Biodiversity

Talking about the environmental aspect, the direct effect of power initiatives can certainly be attributed to the field of climate protection. The application of renewable energies and energy efficiency measures reduces CO2 emissions and consequently mitigates climate change (Aderhold et al., 2015; Berlo, Wagner, Drissen, et al., 2017; Rave, 2016; WECF, 2016).[117]

Besides that, renewables can also exert other positive environmental effects but also challenges.[118] Decarbonizing benefits are damped by the challenge that an expansion of renewable technology also implies that plenty of resources and energy is needed to produce the technical means and facilities. Thereby, also substantial interference with natural landscapes can be expected (Hauser et al., 2015).[119] Yet, some researchers claim that the environmental commitment of initiatives such as transition towns, energy cooperatives, co-housing projects and co is potentially deeper than of conventional projects (Hopkins, 2010) (Interview 3). Instead of aiming at a sheer decarbonization of the power sector, they rather target at creating an environmentally friendly and sustainable infrastructure as a whole, whose environmental footprint is as small as possible. This can utter into a more comprehensive and sensitive environmental planning of power projects but also into spending of financial return on environmental projects, such as ecosystem restoration or climate-friendly renovations (Hauser et al., 2015; Seyfang & Smith, 2007) (Interview 2 and 3).

Another certain environmental effect that needs to be highlighted is the change of consumption patterns that is being triggered. The people engaging in alternative power initiatives are very consciously dealing with topics such as energy provision, climate and environmental protection (Hauser et al., 2015; Kaphengst & Velten, 2014). Thereby not only the awareness of environmental problems is rising (Seyfang & Smith, 2007; WECF, 2016) but the knowledge gains are directly transferred into behavioral change (Seyfang & Smith, 2007; World Economic Forum, 2016). Alternatives are lived instead of just known (WECF, 2016). Although some critics claim, that the people who engage in such projects tend to have been environmentally aware already before (Hauser et al., 2015), others say that due to their usually local embeddedness and connectedness these kinds of projects can also enhance the problem sensitivity and learning process of externals (Hauser et al., 2015; Rückert-John et al., 2014; Seyfang &

[117] "In Germany, renewables offset an estimated 168 million tons of CO2-equivalent emissions in 2015, of which 103 million tons were [emitted] in the power sector alone." (Morris & Pehnt, 2016, p. 9)

[118] As most of them are, however, solely attributed to renewable technology itself and not so much to alternative power projects in particular, they shall not be considered here. For further reading see Morris & Pehnt (2015) and Greenpeace (2013).

[119] This issue could potentially be even more problematic in the case of the distributed energy facilities. As mentioned before in chapter III.5.1., the fact that those power plants have lower capacities also means that a higher number of facilities is needed to meet the demand. Thereby not only installation is occurring nationwide, but also the overall demand for land increases (Hauser et al., 2015). Here, innovative use of land and space can alleviate the effects, hence, e.g. roof top or basement power provide a certain entry point.

Haxeltine, 2012)(Hauser et al., 2015; Seyfang and Smith, 2007; Rückert-John et al., 2014).

As lined out in the sub-chapter 'normativity gain', the detected alternative power initiatives in many ways touch upon the elaborated target system of cities. It can, therefore, be stated that they contribute positively increasing public value. As effects can often be traced back to their application of alternative ideological concepts, it can also be expected that projects that apply different concepts at the same time can tackle various goals simultaneously. For the case study analysis, special focus shall therefore be lain on projects that link the basic 'do-it-yourself' principle with other factors such as 'joint consumption/production', 'locality', 'autonomy'. In this regards energy cooperatives, city grids, eco-energy villages/transition towns, co-housing projects, quarter solutions, and re-municipalized grids/power generations stand out (see table 1).

IV. Empirical Part

After having clarified what is being understood as alternative power initiatives and that they inherit substantial socio-ecological innovation potential (chapter III.5.2) – by having worked out their normativity gains, in particular –, theoretically derived knowledge shall be tested by analyzing three different case study projects (chapter IV. 1.-3.) in the city of Berlin: the ufaFabrik Berlin, a special co-housing project, the Leuchtturm eG, a housing cooperative and the Berliner Stadtwerke (BSW), Berlin's re-municipalized power utility. Thereby, it shall also be looked at whether they were somehow managed by the city of Berlin and what could be done to support them more efficiently (chapter IV.4.).

1. Case Study Project: ufaFabrik Berlin e.V.

Picture 1: The ufaFabrik

Source: Russell (2007)

Overview

The ufaFabrik Berlin is a "conglomerate of a diverse range of undertakings" (Interview 1, p. 1*).[120] On a total area of 18,566 square kilometers – in Tempelhof – it combines the idea of community living with on-site occupation in the areas of cultural economy, education, social networking and care work, as well as in ecological projects (UfaFabrik, 2018e)(Interview 1).

The ufaFabrik – which is organized as a registered umbrella association (e.V.) – has its roots in the 1970s. Back then, a group of people gathered together in shared flats and a craftsmen collective and some years later hived off the association called 'Fabrik für Kultur, Sport und Handwerk e.V.' (factory for culture, sports and handcraft). In the late 70s they then cooperated with other Berlin groups and together organized a big environmental festival, "in order to show, what they are able to do, and to present their innovations and ideas"[121] (Interview 1, p. 1*). When the festival – which lasted six weeks – had finished, a group of about 70 people decided to keep up the project's spirit and looked for a place to permanently establish their living concept. In 1979, they found the abandoned film laboratory of the former UFA-Film stock corporation and occupied the ruin, which was close to be torn away (UfaFabrik, 2018c)(Interview 1).

When having been granted the right to stay on the areal by the senate (UfaFabrik, 2018c), they started making the areal livable.

> Still, "[f]irst, rooms were restored, which were essential for work and visitors: the Café Olé, the present-day event hall, the whole-grain bakery, the training rooms. By the way and much later, it was the turn of the so called private rooms, the joint kitchen, one bathroom, the common room for the plenum, playing rooms for the children and individual rooms and living areas." (Niemer, 2017, p. 1*)

This already indicates the strong sense of collectivity and sharing which has always been pivotal for the ufaFabrik (Interview 1).[122] The idea of sharing rooms and resources is, besides its social component, a crucial element of the ufaFabrik's ecological self-image (Interview 1). The aim to ecologically design and develop the ufaFabrik is one if its guiding principles (UfaFabrik, 2018l). This is, for instance, being reflected in substantive building restoration and modernization measures[123] as well as in early do-it-yourself attempts in the energy field, due to which the ufaFabrik can substantially

[120] Thereby, the ufaFabrik could only produce such a diverse portfolio of activities and offers as it, from the beginning, has built on the skills of all of its participants, that fruitfully compliment and benefit from each other (Niemer, 2017).

[121] "A mixture of most diverse, new approaches for cultural performance, healthy nutrition, environmental technology, education, sensible ways of working, social interaction and mild healing methods were presented to the interested guests." (UfaFabrik, 2018c*) In the environmental technology field, for instance, they showed off different types of wind mills and installed one of the very first solar showers on the area (UfaFabrik, 2018b) (Interview 1).

[122] This even went that far that, in the first years, the people refrained from own property and individual income. "[A]ny common earnings were immediately invested" (Niemer, 2017, p. 1*) in the joint living project.

[123] energy saving light bulbs, insulation with ecological material, replacement of windows, choice of electronic devices, … (UfaFabrik, 2018b)

sustain itself with energy. (UfaFabrik, 2018b, 2018i). From the beginning, the project ufaFabrik benefitted from the diverse range of skills that the different people brought with them. By this means and over the years a colorful set of activities and offers has developed on the areal of the ufaFabrik.

What is new and how new is it?

As the ufaFabrik does not only have a strong do-it-yourself attitude but further shows characteristics of sharing, joint action, and autonomy, the ufaFabrik can be regarded as alternative power initiative as defined in this paper. The ufaFabrik is a project that combines „ideas from a diverging, collective and ecologically orientated life“ (UfaFabrik, 2018d*). By its self-image it is, thereby, very different from conventional forms of living that tend to be individualistic, anonymous and indifferent about environmental issues – particularly in the big metropolis Berlin.

Moreover, the ufaFabrik also sticks out among other co-housing projects due to its dissolved “borders between living and working environment” (Niemer, 2017, p. 2*). Also, its very holistic sustainability concept does not only aim at bringing the three dimensions ‘social sphere’, ‘economy’, and ‘ecology’ in a balance, but further adds the forth pillar of ‘culture’ to the former triangle (UfaFabrik, 2018g, 2018l) (Interview 1).

Despite its long time of operation – the project started in the 70s – due to its peculiarity it can be regarded as rather radical innovation.

For whom does it appear to be novel?

Novelty is, first, acknowledged by the project and its participants themselves. Accordingly, the case study interviewee stated: “This [working and living environment] is, thus far, quite different from what is happening out there.” (Interview 1, p. 7) During the interview it further got clear that the project’s novelty and innovative potential is further acknowledged by the neighborhood that gladly makes use of the various offers of the ufaFabrik[124] and the city administration – which does not only ask the project staff for its expertise[125] but also makes use of it when externally promoting Berlin[126] –, but also enjoys international fame (Interview 1 and 3). The ultimate proof for the latter is that, in 2004, the UN Habitat selected the ufaFabrik from a pool of 700 pilot projects and assigned it with

[124] „When they get visitors, they can sleep in the guest house, or sit in the beer garden in the evening, cozily. Or they can just send their children to the farm and then they have something to do here, and so on.” (Interview 1, p. 5*)

[125] „[W]hen they - the government, the administration in the district, wants to do something novel in the district, then they call us, they call Renate, and ask Renate: ‘Do you have any ideas for that? Can one do it like that?’” (Interviewe 1, p. 10*)

[126] For instance, the case study interviewee mentioned that the former senator Peter Strieder, former head of the senate administration of city development, environmental protection and technology, depicted the ufaFabrik when portraying the ‘sustainable Berlin’ in Kyoto, and that the city government often brings special guests, like foreign mayors, to the ufaFabrik (Interview 1).

the title 'Best Practice to Improve the Living Environment' (Interview 1) (UfaFabrik, 2018b, 2018l).

By whom has it been triggered?

As lined out before, the ufaFabrik was triggered by a small group of craftsmen and creative people that, inspired by the success of their well-organized festival of 1978, decided to steadily establish their ideas on the areal found in Tempelhof. Hence, the project was established bottom-up, by 70 visionary people, eco-pioneers and enthusiasts with a strong hands-on mentality (Interview 1 and 3). Initially the project was even entirely financed by the collectivized group budget and earnings (Interview 1; Niemer, 2017).[127] However, over the time and with increasing degree of professionalization also EU-funding, project budgets and city grants started to play an ever more important role (UfaFabrik, 2018b, 2018k) (Interview 1). Also, the project would not have been possible without the support of the Berlin Senate who granted the ufaFabrik with the right of residence on the area, which was later translated into a leasing contract (ibid.).

Processual stage in which it is situated?

After an intense phase of experimentation (Niemer, 2017), over the years, the ufaFabrik has clearly established and professionalized itself. As the case study interviewee put it:

> „Of course, we are out of the teething troubles. […] Well, the ufaFabrik has several times passed the test and is [now] a distinct institution in the landscape ‚Berlin'." (Interview 1, p. 6*)

Although the phase of professionalization has introduced some changes[128], the ufaFabik's core characteristics and vision could be conserved. However, the idea of scaling-up their project was explicitly neglected by the case study contact, as he sees the growth idea conflicting with the ufaFabrik's identity and vision (Interview 1).

Normativity Gains?

Reduce Poverty and Increase overall Living Standard

Due to its very peculiar combination of living and working environment (Interview 1), the ufaFabrik has certain awareness but also leverage, when it comes to the issues of poverty and living standard.

Today, about 30 people live and work in the ufaFabrik – another 200 people is being employed by the ufaFabrik and its sub-organizations

[127] However, one has to note that they, first, didn't pay anything for the land and, second, executed any restoration tasks by their own labor force (Interview 1).

[128] For instance, over the years the amount of residents has crystalized down to about 35 people, the group budget needed to be dissolved – due to tax reasons –, the neighborhood and cultural centers formed own associations and are now legally separate entities – despite held together by the umbrella association ufaFabrik e.V. –, and the residents' wish for more privacy was accommodated by building more bathrooms and small kitchens as well as more individual rooms (Interview 1; Niemer, 2017).

(UfaFabrik, 2018m). Thereby, "everyone is paid according to their activity" (Niemer, 2017, p. 2*). In this regards, the case study interviewee stated:

> "Well, no-one here lives in the lap of luxury or has that much money that he can excessively waste it. However, there is also no-one who is let down." (Interview 1, p. 7*)

This, first, indicates that the ufaFabrik actively tries to enable its residents – but also its employees – to afford a certain standard of living. For the inhabitants, this modus of decent pay is further being reinforced by rather low living expenses – all adults only "pay a flat charge for the living area that everyone uses" (Niemer, 2017, p. 2*) – and as running costs are rather low, due to the well aligned energy concept (Interview 1) (UfaFabrik, 2018b see environmental goal). Second, with the statement the interviewee indicated that they have built up a social support structure, so that if someone is in (financial) trouble, the others can help out. Consequently, poverty is an issue that does not so much threat the residents of the ufaFabrik.

However, the poverty reduction effect is not only limited to the ufaFabrik's direct members. By further providing external people the opportunity to work at the ufaFabrik and by designing prices, e.g. for their cultural events, in a socially solidary and affordable way (Interview 1), also some degree of spill-over can be identified.

Increase Human Health and Well-being

The ufaFabrik is a model of community living and joint work, that builds on the people's skills for self-government and -fulfillment (UfaFabrik, 2018a, 2018d). It is, therefore, inherent to its concept to provide everyone with space to test their capacities and to strive for self-realization and -expression (Interview 1; Niemer, 2017.) "The one more in the technical area, the other one with animals, and again others with children, and so on." (Interview 1, p. 2*) Beyond that people are actively being (UfaFabrik, 2018a*) motivated and supported to develop their full potentials, due to the openness to trial and error[129] as well as the diverse range of workshops, trainings[130], self-help groups and mutual learning spaces that have been created. The ufaFabrik can, hence, be regarded as empowering "location for creativity, for artistic, societal and ecologic shaping processes" in which people can "develop and express commonly and creatively" (ibid.*). Thereby, not only the ufaFabrik's direct members are encouraged to strive for self-fulfillment, but also externals participating in the activities.

Moreover, the collaborative and familial character of the project has been perceived as positive attribute. Still, it is not being concealed that it also inherits conflict potential.

[129] „I studied physics and I am doing environmental technology here. Hence, I have just figured out how to do that, some when in the 90s. […] I am not an architect, but I have already built houses. […] And this is how the people here accumulated their expertise and some also with trial and error." (Interview 1, p. 14*)

[130] e.g. circus school, rehearsal rooms, percussion and dance workshops

> "The ufaFabrik is definitely comparable to a family or village structure. Everyone knows everybody; one has to get along with everyone. If it just works well, everything is wonderful. If, however, difficulties emerge, it can get very exhausting and personally incriminating for the individual. No-one can avoid, until the conflict is solved, and this can sometimes take quite some time." (Niemer, 2017, p. 3*)

The interviewee, however, did not mention negative group dynamics. He only stated: "Here, we can also not escape from human shortcomings; like everywhere else, we are all just humans." (Interview 1, p. 7*) It, therefore, rather seems that the project participants "have learnt to respect and esteem each other and their peculiarities and to be more generous with each other" (Niemer, 2017, p. 3*), and thereby is expected to satisfy the residents' psychological needs.

The case study contact further mentioned positive effects of less stress-full working conditions[131] and the more green and natural living environment, which is e.g. due to the greening of roofs and facades (Interview 1) that creates a "green oasis in the [middle of] metropolis" (UfaFabrik, 2018h*).[132]

The successful combination of active empowerment for personal development, people being able to strive for self-fulfillment and -realization, the strong and appreciative social and familial network as well as the more natural living environment "contributes a lot to health; to the physical but also to the mental one" (Interview 1, p. 7*).

Reduce Inequalities and Foster Social Cohesion

The ufaFabrik is a community with "a relatively high sense of justice" (Interview 1, p. 7*), which is due to its strong sharing and collaborative approach. In its beginnings, this most extremely uttered in the rejection of individual property, which put everyone – irrespective of his or her economic contribution – on the same level (Interview 1). Today, it reveals in the effort of keeping income differences between the employees and members of the ufaFabrik rather low – despite exerting different responsibilities – as well as in the principle of equal pay for the common living space (Interview 1; Niemer, 2017). Moreover, the organizational structure of the ufaFabrik, which takes important decisions in plenum – where all members of the community take part – and consensus so that everyone can contribute but also criticize, orientates towards enabling equal participation (Interview 1).

Furthermore, also beyond its own community the ufaFabrik aims at contributing to equality and social cohesion. From the beginning, the ufaFabrik was meant to be "an interdisciplinary, multicultural place for encounter, a vivid and philanthropic oasis" (Niemer, 2017, p. 1*) where the "vision of an open, tolerant and multifaceted living" (UfaFabrik, 2018h*) could be realized. Consequently, the ufaFabrik actively invites others –

[131] "We deal a bit easier with that. Well, it might be, because this is our thing, the ufaFabrik is our ufaFabrik, that we work for. Maybe this is already such a factor that positively impacts health, instead of feeling so exploited in some random company." (Interviewee, p. 7*)
[132] besides its positive and healthy effects on air quality and on climate control (UfaFabrik, 2018f)

regardless of their age, nationality, religion or occupation – to take part in their project.[133] For this reasons, the areal of the ufaFabrik offers several meeting points, e.g. the neighborhood center, the farm, the Café Olé (ibid.).

Over the years, the integrative approach has even got institutionalized in form of the neighborhood center 'NUSZ'.

> The center is being active in the areas "neighborhood and self-help, consulting and offers for non-violent co-habitation, municipal interference in the city district, voluntary engagement and honorary posts, cultural and physical activities, courses for pregnant women, mothers, babies, dance and movement, self-defense and sport" (UfaFabrik, 2018j*) and is open to anyone who is interested or needs help.[134]

Hence, the ufaFabrik actively provides room and personnel to "people, that have certain problems in society, or strong problems" (Interview 1, p. 8*) and, thereby, tries to make a contribution to social cohesion.

Empower Women and Girls

The above mentioned aspects on empowerment and integration account in the same way to women. When asked about the gender aspect, the case study interviewee states: "Everyone is human! We do not make any difference whether it is a women or men." (Interview 1, p. 8*) Particularly gender sensitive management, however, seems to be absent. Still, the neighborhood center – which itself has developed out of mothers who grouped together in order to self-organize – has a certain focus on family consulting and care. In this regards, also certain projects[135] target the needs and empowerment of women and girls, in particular (UfaFabrik, 2018j, 2018k).

Foster Inclusive Economic Growth

While in its beginning the ufaFabrik was organized entirely collectively and fully financed from the modest group budget, today's organizational and financial structure is more complex. Over the time, the ufaFabrik e.V. had transformed into an umbrella organization under which several undertakings, clubs and companies operate semi-independently: "the circus school, the guest house, the LPG-bakery and organic store, the cultural operation, the neighborhood center and many more" (Niemer, 2017, p. 2*).[136] However, the undertaking is held together by the umbrella organization that decides on development pathways, administrates the areal and its buildings and takes care of the acquisition of funding (Interview 1; Niemer, 2017).

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[133] The interview contact described this attitude with the following words: "Well, inclusive we are!" (Interview 1, p. 8*)

[134] An extensive overview of all projects and fields of activity can be gained at: https://www.nusz.de/start/.

[135] projects to the support of single mothers, integration courses for foreign women, intercultural learning for girls from nine nations, 'night-time mothers', project 'grandmas', …

[136] While the neighborhood center, as well as the cultural center, strongly depends on public compensation of uncovered expenses, the other areas need to operate economically (Interview 1).

Thereby, the ufaFabrik benefits from several cost-saving effects. First, a lot of activities on the areal have been offered voluntarily. This holds particularly true for the restoration of the areal and buildings of the UFA-film factory. However, also in other areas such as the social work, plenty of activities build on honorary posts. In this regard, the interview contact stated: "[I]f the senate did this himself, it would cost twice as much […]. We are much more reasonably-priced in this regard." (Interview 1, p. 6*) Eventually, the well aligned energy concept does not only reduce the running costs of the project – as need for external power input is rare and energy losses are kept as low as possible. Sometimes electricity production even exceeds the demand, is consequently being fed into the grid and reimbursed accordingly (Interview 1) (UfaFabrik, 2018i, see environmental goal). Hence, one can say that ufaFabrik is an undertaking that, over the years, has professionalized and learnt to operate economically.

However, it has been highlighted by the case study person that the ufaFabrik does not function according to the logic of economic growth. Economic operation is rather community-orientated, which is being reflected in the prevailing attitude that money that is being saved or surpluses that are being generated can be re-invested in "other creative projects" (Interview 1, p. 3*). Due to this community-orientation, the ufaFabrik can be regarded as economically inclusive (Interview 1). Moreover, and as it has already been outlined before, the ufaFabrik contributes to the creation of decent work and pay, which constitutes another positive economic impact.

Foster Resilience

In the case study interview, the contact person described how the diversity of skills and knowledge represented in the ufaFabrik as well as the strong social network – that resembles a social support structure – results in a high ability to absorb shocks. He states: "We are too creative for that, maybe." (Interview 1, p. 8*) This accounts both for individuals who are in trouble and not being let down[137] (see poverty reduction), but also for the ufaFabrik as a whole. Due to its positive experience with trial and error as well as to its willingness to constantly re-check the effectiveness and up-to-datedness of its goals and activities, it is able to intervene adaptively at early stages. Also its high degree of self-organization, self-help and (energy[138]) autonomy[139] contributes positively to its rather high resilience (Niemer, 2017).

[137] Here, it shall be reminded that the social support system that they created is not limited to the living community itself. Via the neighborhood center its empowering effect also can be of benefit for externals.

[138] The high degree of energy autonomy is, thereby, only one part of that characteristic.

[139] "It was the ufaFabrik that has just said: 'Well, we just do it without a support program for root-top constructions or so.'" (Interview 3, p. 3*)

Protect and Restore Ecosystems and Biodiversity

Before, it has been mentioned several times that the energy concept plays a crucial role in the project's self-image. First, the community lives the sharing idea and thereby not only reduces individually used space but also energy demand. Also, several ecological insulation measures and vast installation of energy-efficient devices were undertaken (UfaFabrik, 2018i) (Interview 1). Moreover, the ufaFabrik has been one of Berlin's early power pioneers (UfaFabrik, 2018b)(Interview 3).

In 1979, the ufaFabrik had one of the very first co-generating power plants of Berlin – which is not renewable but at least more efficiently makes use of the energy produced. Today, and since 1994, the energy demand of the ufaFabrik is to 78% met by a modern block heat and power plant, which runs on gas. Since 1995, the power concept has been accomplished by a wind mill, which was installed on the roof of the former 'film bunker', and that produces up to 700 Watt electric power. Some years later, also by roof top solar panels that produce up to 53 kW.[140] The three elements are further intelligently and optimally combined via a central building control system, so that the use of conventional energy is kept as low as possible (UfaFabrik, 2018b, 2018i). Hence, the CO2 footprint of the ufaFabrik is actively tried to be kept as low as possible.

However, the ufaFabrik's ecological efforts go much beyond producing green energy and aiming at reducing energy demand. Its green roofs and facades, for instance, contribute to the natural insulation of the buildings but also filter and retain precipitation – thereby reduce both groundwater pollution and the threat of inundation – as well as create a biotope in the middle of a metropolis. Moreover, the plants do not only bind CO2 but further lock-in water that subsequently evaporates and thereby creates a desired cooling effect on the area.[141] However, also the ufaFabrik's water demand and waste production are being targeted by innovative solutions: Rainwater is being collected, treated with plant filters and used for their sanitary facilities; while waste is going through a sophisticated recycling and composting system so that at the end residual waste can be reduced to 15% (UfaFabrik, 2018b, 2018f).

Hence, the ufaFabrik can be regarded as eco-pioneer. Thereby, it strongly aims at distributing the knowledge attained. The ufaFabrik regularly organizes environmental festivals (e.g. the ufaBoulevard) and exhibitions, seminars and workshops (e.g. in building with straw and loam), as well as conferences and symposia. It also holds several cooperations with universities and vocational schools[142] in order to motivate the youth to

[140] Back then this was the biggest solar power facility in Berlin (Interview 3).
[141] The interviewee describes this as his "approach to counter temperature rise" (Interview 1, p. 9*), and thereby, yet again, proofs the ufaFabrik's pioneer capabilities, as the topic of so called 'blue roofs' has just recently gaining attention in Berlin (Interview 2).
[142] e.g. via the ‚Leonardo da Vinci' partnerships; a participation in the program 'Erasmus for young Enterpreneurs'; a direct cooperation with the vocational school of Santiago de Compostella Carlos Trias (offering internships) (UfaFabrik, 2018b)

engage with environmental topics and to jointly progress in the solution of environmental problems.[143] Moreover, the members of the ufaFabrik engage in round tables, podium discussions and municipal strategy talks and, thereby, also try to bring in their expertise on decision-levels (UfaFabrik, 2018b) (Interview 1). Hence, besides substantially having changed consumption patterns themselves, the ufaFabrik not only constantly tries to find new solutions to environmental problems but also actively encourages others to take environmental responsibility.

It could be shown that the ufaFabrik finds solutions to a vast variety of societal challenges and, therefore, its overall contribution to Berlin's target system shall be regarded as considerable. Some of the outlined effects only exert impact on the residents of the ufaFabrik. However, with many activities – the cultural and neighborhood center in particular, but also with the integration of externals into the ecological projects – it also consciously transcends the projects limitations to its geographical plot and group members. The outlined benefits are, therefore, expected to exert transmission effect. Still, the case study interviewee himself was rather skeptical about the ufaFabrik's overall societal impact (Interview 1).

2. Case Study Project: Leuchtturm eG

Picture 2: The Leuchtturm eG

Source: own picture

[143] For instance, it holds research cooperation with the TU in the field of ‚roof physics' and with the University of Applied Science of Neubrandenburg in ‚roof-top vegetation' (UfaFabrik, 2018f).

Overview

The Leuchtturm eG is a co-housing project in the Pappelallee in Prenzlauer Berg, Berlin. The project is run by a cooperative (eG) – in which all residents are members – and aims at realizing the vision of joint and self-governing, affordable, intergenerational but also ecological living (Interview 5) (DBZ, 2010; Leuchtturm eG, n.d.-b, n.d.-c; Prenzlberger Ansichten, 2008).[144]

In 2004/2005, the project 'Leuchtturm eG' was initiated by Markus Ibrom and Gabriele Schambach (Prenzlberger Ansichten, 2008; Stattbau, 2012) with the idea that it should be possible to build a house without having own capital (Interview 5). Quickly, they then came to the conclusion that this vision can only be realized via the organizational form of a cooperative. Hence, friends but also – so far – unknown persons were enlisted (Interview 5) and in 2007 the cooperative 'Leuchtturm eG' could register (Leuchtturm eG, n.d.-b). With the strong support of their architect Irene Moor they had also found the appropriate site in the Pappelallee (Interview 2). However, the common equity of the group would not have been sufficient for buying the land, which the interviewee described subsequently:

> "The land costed half a million, I think. And not even this we would have been able to afford with the people back then. They only had about 250,000 – cash. So we looked for a foundation – or rather we were suggested a foundation – the trias." (Interview 5, p. 5*)[145]

The cooperative gave their 250.000 € to the foundation, who added another 250 out of their own budget and bought the land. Ever since, the trias owns the land on which the Leuchtturm eG has built, and leases it out to the cooperative via a long-term building lease contract that lasts for 99 years. This implies that the project cannot be speculated with at the equity market (Interview 2 and 5). In a next step, more people were recruited[146] so that at the end, with equity worth about 800.000 € and an additional bank loan (Interview 5; Prenzlberger Ansichten, 2008), the housing project could be physically realized. Eventually, construction phase started in 2008 and "[i]n october 2009, 27 adults and 15 children moved into the apartment house Pappelallee 43" (Leuchtturm eG, n.d.-c*).

Today, 28 adults and 17 children live in the newly built house, which consists of seven stories[147] and complies with highest passive-house standards (Interview 5). Besides the 17 individual flats,[148] – and one guest

[144] Thereby, the interviewee did not explicitly mention the factors of self-government/autonomy and intergenerational living. According to him, the resident's main motivation to move in was the vision of affordable and stable rents (Interview 5).
[145] They contact to the trias foundation formed via Miss Moor, who back then was member of the curatorship of the trias foundation (Interview 2).
[146] "And on this way, due to the money issue among others, the group has changed several times." (Interview 5, p. 1*)
[147] In the ground floor also space for commercial use was included (Leuchtturm eG, n.d.-c).
[148] Most of the flats are classically structured – i.e. also having their individual kitchens and bathrooms –, except of one bit shared flat that occupies a whole story (Interview 5).

apartment –, the house provides plenty of space for encounter: one common room – e.g. used for plena, parties or watching TV –, the washing room and a spacious garden (DBZ, 2010; Wohnprojekte-Portal, 2017) (Interview 5).[149] As the cooperative jointly owns the house, and as property for the land has been forwarded to the trias foundation, the housing project Leuchtturm eG is not property-orientated (Tagesspiegel, 2010).

What is novel and how novel is it?

Despite looking like a typical modern apartment house from the outside, the co-housing project sticks out due to its comprehensive energy concept and its organization in form of a cooperative. Thereby, it does not only diverge from individual forms of living. By having forwarded land ownership to the trias foundation, the housing project Leuchtturm eG is explicitly being removed from Berlin's equity market. In this way it, first, substantially differs from conventional residential building investors such as the 'Deutsche Wohnen' (Rohrbeck & Rohwetter, 2018).[150] Moreover, by this means, it also deviates from other housing cooperatives, who focus on creating value for their members. As the Leuchtturm eG impeded its transformation into property, its focus rather lies on the creation of community-value.

"The Leuchtturm eG [therefore] regards itself as alternative to existing urban forms of life and living" and further "as positive contribution to a positive change of the current societal situation" (Leuchtturm eG, n.d.-b*). However, the interviewee did not fully share this evaluation. To him the Leuchtturm eG does actually not differ so much from conventional houses (Interview 5).

By whom is it acknowledged?

The interviewee rather regards the Leuchtturm eG as ordinary construction group than as particularly innovative; except of two characteristics, namely the cooperation with the trias foundation and their so called 'rucksack' principle – which will be outlined later. Most of the other characteristics he regards as common sense and potentially possible in conventional apartment houses. However, academic interest – engineering interest in particular – in the project seems to be high (Interview 5). For outsiders, in return, it is difficult to experience the inner values of the Leuchtturm eG. In this context, the interviewee told:

> "Well, when we moved in [...] it had actually happened that some autonomous people smashed our windows down-stairs, because from the outer perspective we are of course part of the gentrification: new-rich, concrete, huge windows of glass." (Interview 5, p. 7*)

[149] The Leuchtturm eG contains the further architectonic highlight that its floor plan is variable so that the size of apartments can be flexibly adapted to changing circumstances (Interview 5).
[150] Similarly to privatization processes in the power sector, also council houses were more and more sold to private investors. While in 1990 Berlin still owned 340,000 social housings, in 2016 it was only 117,000 (Rohrbeck & Rohwetter, 2018).

Also, no particular acknowledgement by the city of Berlin could be identified. General acknowledgement, hence, seems to be rather low.

By whom has it been triggered?

As mentioned before, the project Leuchtturm eG was initiated by Markus Ibrom and Gabriele Schambach, who came up with the idea and also recruited a group to form a cooperative. The process was further strongly supported by the dedicated architect Irene Moor. The Leuchtturm eG was, therefore, strongly triggered bottom-up by a small group of individuals and was mainly financed privately.

Processual stage in which it is situated?

The construction has been finished in 2009 and ever since the composition of members is rather stable (Interview 5). Since its implementation, fundamental changes have been rather absent.[151] The project has, therefore, more or less settled down. The set-up of new projects is, at this point, not foreseen (Wohnprojekte-Portal, 2017; Interview 5) – although the interviewee admitted that now it would be easier, as they could lend on their house (Interview 5).

Normativity Gains?

As mentioned before, the interviewee seemed to be rather skeptical about the positive contributions of the Leuchtturm eG, which is probably due to several cleavages that seemed to dominate his overall evaluation. Still, some factors were mentioned and shall subsequently be lined out.

Reduce Poverty and Increase overall Standard of Living

The Leuchtturm eG is situated "in the middle of luxuriously renovated old buildings" (Lee, 2005*) in Prenzlauer Berg, one of the quarters in Berlin which are particularly affected by gentrification – since 2009 rent has risen by 58% (Tröger, Klack, Pätzold, Wendler, & Möller, 2018).[152] Here, the housing project resembles an island that can potentially have a counter effect. Already today, the rents in the Leuchtturm eG are comparably low with 11.50 €/m² (warm) – compared to an average rent of 14.75 €/m² (warm) in Prenzlauer Berg (ibid.) (Interview 5). As the rent mainly exists for paying off the loan (Interview) the Leuchtturm eG can benefit from cost-saving effects during its construction phase[153] – mainly that they didn't have to take up loan for the land. Rent is however also that low, as the cooperative is not allowed to make profits, but to just build up a reserve (Interview). Eventually, rent will decrease further with time (Gellner, 2006;

[151] "[I] would say that currently there are no group processes anymore that question the epistemologically or ideology questions [the status-quo]." (Interview 5, p. 6*) One exception thereof may be that they broke with their principle of deciding in consensus and rotation of house management tasks (Interview 5).

[152] Also generally speaking, Berlin is the city in Germany being most affected by rising rents (+28% between 2012 and 2016) (Rohrbeck & Rohwetter, 2018).

[153] „Despite the high [environmental] efforts building costs lay around 1,648 Euros per square meter living area at a comparatively cheap level." (Tagesspiegel, 2010*)

Lee, 2005); unlike the other rents in Berlin which are projected to continue rising. The interviewee described this effect with the following words:

> "[W]hen we payed off, it [the rent] will drop below 6 €; and stay there permanently. [...] Then we [only] have to pay the long-term lease and the management costs, i.e. insurance, repairing, and so on." (Interview 5, p. 5*)

Also the running costs are comparably low, due to the Leuchtturm eG's passive house standard. However, the interviewee mentioned that they lately discovered a loophole:

> "There is a minor group of people that moved in with an unfavorable age, among them me [...]. I will probably not live to see the really low rent anymore. Well, I will, when the loan is payed off, be that old that I am who knows where. I will not be able to afford this apartment then." (Interview 5, p. 8*)

Future poverty among the elder group of people is, hence, still an issue in the Leuchtturm eG. However, the working group 'Finance' is trying to develop a kind of internal allocation mechanism to tackle this issue (Interview 5).

Another very peculiar effect lies within the cooperative's decision to enter the long-term leasing contract with the trias foundation (see Interview 2).

> "[T]he good thing, in an ideological sense, is: [...] the house belongs to the cooperative; the land, however, does not and this means that we [they] cannot speculatively sell this equity." (Interview 5, p. 5*)

This means that the Leuchtturm eG cannot contribute to gentrification in Prenzlauer Berg. In this way, the Leuchtturm eG exerts intergenerational poverty reduction effect.

Finally, due to the cooperative model, the residents of the Leuchtturm are their own landlords. Hence, they have direct influence on their living standard.[154] As most of the current residents have already been on board during construction phase, they could further design the Leuchtturm eG according to their specific needs and desires (DBZ, 2010; Leuchtturm eG, n.d.-b).[155]

Increase Human Health and Well-being

The project Leuchtturm eG has started with the aim to contribute to a social interaction that "exceeds the ordinary form of neighborhood" (Leuchtturm eG, n.d.-b*). Consequently, individual area in the house was reduced to make space for greater community areas and, hence, social life. Today, according to the interviewee, the issue of community living rather contains conflict potential, then contributing to overall well-being.

[154] Thereby, they are however slightly limited by the cooperative's preamble that states that investments need to be of ecological or social use (Interview 5).

[155] „Considered where hereby, for instance, the barrier-free usability of the apartment and [...] even handicapped accessibility." (DBZ, 2010*)

> "Well, to anticipate this already, there are several cleavages in the house […]; and particularly in the context of this point, how much community do we want or how much community can this group […] fulfill" (Interview 5, p. 1*; see also Tagesspiegel, 2010).[156]

Although most of the Leuchtturm eG's residents might „say that we [they] have a well working house community" (Interview 5, p. 3*), the interviewee revealed that it has broken down into three groups and that some people actively try to avoid each other (Interview 5). Group dynamics seem to be a big hindrance for the project Leuchtturm eG, and negatively affect the people's psychological needs.

Also the idea of mutual empowerment has not entirely worked out as hoped. While they started with the idea that everyone at one point should have exerted each task in the house (Stattbau, 2012), today work is rather divided out along people's existing capacities and availability.

> "Well, we now have a lady from Bavaria, she is in advanced retirement age. […] And this lady […] has now taken over bookkeeping. She has more time, has […] a different relation to numbers, or household management, as the younger generation. The other older couple is the janitor couple. […] [T]hey don't have problems in keeping appointments with mechanics etc. pp."(Interview 5, p. 9f*)

Space for mutual learning has therefore been replaced by a rather rational division of work. This can rather not be framed under the idea that everyone can fully develop their potentials.

Hence, actual positive effects on the well-being dimension were detected to be rather limited.

Reduce Inequalities and Foster Social Cohesion

"In a cooperative everyone has the same voting power, independently from his or her [financial] stake." (Gellner, 2006*) By this means, equality is directly being implemented in the Leuchtturm eG. The democratic principle[157] has, however, been stronger when they made decisions in consensus.[158] Still, people who financially contributed more to the Leuchtturm eG do not have more severe say.

Thereby it has to be mentioned that capital contributions to the Leuchtturm eG's net assets have been substantially deviating.

[156] Besides the question of how much community they actually want, conflicts exist about whether the Leuchtturm eG should also get more politically active in the quarter, about how to use the garden and about different perceptions of tidiness and order (Interview 5).

[157] "The comrades work with the instruments of regular and extraordinary meetings of members, with regular […] plena [to discuss topics and take direction-setting decisions]. The daily business is run by an elected management, which is controlled by an elected directorate. Moreover, the members are organized in working groups [AGs] in which thematic focusses are worked out." (Leuchtturm eG, n.d.-b*)[157]

[158] This principle was given up in a situation of conflict (Interview 5).

> "There is people that only [payed] the minimum of currently 16,000 […]. And there is people who deposited up to 70,000. […] We've called this ‚pickaback [or rucksack] principle'. Initially that really was a social contribution of people who did not know each other; i.e. some substantially better earning people or real inheritors, who had been willing to facilitate others to move in, by backing up their share." (Interview 5, p. 4*)

This certain characteristic of the Leuchtturm eG inherits particular potential for socio-economic integration and cohesion. However, still, the people living in the Leuchtturm eG depict a rather homogenous group:

> "We are West-German middle class. We have […] just one East-German, no foreigners, except of the female refugee[159], and […] [other shared features]. This is indeed a very conform white middle class" (Interview 5, p. 9*).

Hence, despite their so called 'rucksack principle' the precondition to contribute an average capital of 32,000 € rather impedes low-income groups to move in (Interview 5; see also Tagesspiegel, 2010; Interview 6) and, as the interviewee further reveals, it is actually being planned to balance the differences between the financial stakes in the long term. Also the additional rent of about 11.50 €/m² is substantially higher of what people usually paid before moving there (Interview 5). The Leuchtturm eG is therefore not as lucrative for low-income groups as intended (see Gellner, 2006).

However, another certain potential lies within the Leuchtturm eG's explicit promotion of intergenerational living. With 17 children, 25 adults, and three seniors a mix of generations was reached, is, however, not striking (Interview 5; Wohnprojekte-Portal, 2017). The interviewee further revealed that the intergenerational model provides more conflicts – due to different rhythms and priorities – than enhancing in-house solidarity and mutual help.

> "[O]f course the parents with children of the same age stick more together, and the artists tend to stick together. And this group of people sticks more together and that one." (Interview 5, p. 9*)

The realization of the Leuchtturm eG's goals for fostering diversity and solidarity, therefore, seems to be rather problematic; and fluctuation of people is not that high (Interview 5) that changes – due to the input of new, outer perspectives – are foreseeable.

Empower Women and Girls

No particular information on the gender topic could be derived. It is therefore being expected that the project's potentials to contribute to gender empowerment is, currently, not perceived or not being in the focus.

[159] The group provided room for a refugee and collectively pays the difference between the rent and the money she receives from the public offices. She is, however, not a comrade of the Leuchtturm eG but a normal tenant (Interview).

Promote Inclusive Economic Growth

The Leuchtturm eG is a cooperative and as such an economic entity – albeit the project does not really consider itself as such (Interview 5). Its economic model is based on the tenants paying a rent – in order to cover running costs and paying-off the loan (Stattbau, 2012) –, with the peculiarity that the tenants are landlords at the same time (Interview 5). As cooperative the Leuchtturm eG is a not profit-driven business, i.e. minor returns – that are payed into the obligatory reserve – are only used for maintenance and re-investment in the housing project. By this means the Leuchtturm eG economically operates for the benefit of the overall community and, hence, inclusively (Interview 5).

On the other hand, this implies that the economic growth logic is not applicable to the project. Still, the Leuchtturm eG cannot afford to operate uneconomically. This is even being regularly audited by the cooperative's union, and further is in the interest of the comrades themselves (Interview 5). As they all deposited capital into the project, it is in everyone's interest to avoid insolvency. Cooperative housing models, therefore, count as quite stable and reliable investment (Lee, 2005). Economic viability is, hence, expected to be high.

Thereby, the cooperative benefits from several cost-saving effects. First, and as it has been mentioned before, during construction phase a substantive amount of capital uptake could be avoided via the cooperation with the trias foundation, but also as the comrades themselves invested voluntary work and time into the project.[160] Today, also the maintenance and daily management of the Leuchtturm eG is administered voluntarily (Interview 5; Stattbau, 2012), but also the sharing-principle – e.g. of the washing machines – as well as the energy concept lowers the cost-side of the operation (Interview 5; DBZ, 2010).

Foster Resilience

The ideal of self-government and autonomy has been one of the basic motivations for kick-starting the 'Leuchtturm' project (DBZ, 2010; Leuchtturm eG, n.d.-c). Organizational it has been reached by the 'do-it-ourselves' principle regarding the maintenance of the housing project.

Energetically speaking, the Leuchtturm eG is not entirely autonomous – especially due to the missing electricity generation facility –, however, due to its passive-house standard (DBZ, 2010), utilization of external energy input is quite low, which makes the project rather independent from energy price developments (Leuchtturm eG, n.d.-a). According to the interviewee, projected long-term price stability – particularly in regards to the rents – has been the main motivation for the residents to move in (Interview 5) and is also probably the projects' strongest effects.

[160] However, this was rather for gathering of information. The construction of the house was executed by professionals.

Moreover, the architectonic peculiarity of the Leuchtturm eG to refrain from fixed floor plans provide for certain flexibility. Inside walls can be shifted so that room sizes and forms can be adapted to altering family sizes or other circumstances (Interview 2 and 5). So far they have, however, not made so much use of this feature (Interview 5).[161]

Another resilience-building effect lies within the cooperative's organizational structure in form of working groups (AGs)[162]. As lined out before, the group has lately detected that it faces the certain threat the elder generation will not be able to afford the apartments in future (Interview 5). However, as they commonly detected this problem in a rather early stage, they can react and find solutions – e.g. inner allocation mechanisms – to solve this problem.

Consequently, the Leuchtturm eG possesses several characteristics that positively contribute to the cooperatives' overall resilience.

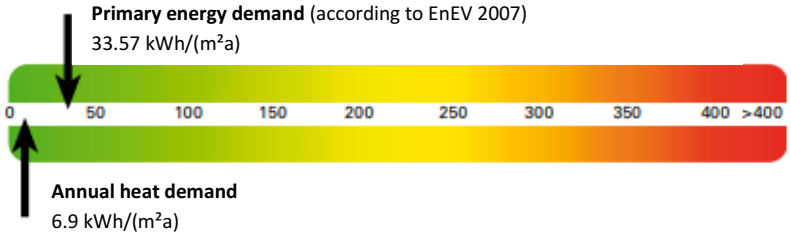
Protect and Restore Ecosystems and Biodiversity

In the environmental field, the Leuchtturm rather focusses on reducing its carbon footprint, by reducing individually used living area as well as the largely energy-autarkic design of the building (Leuchtturm eG, n.d.-a, n.d.-c).

> "With a geothermal heat pump and solar collectors on the roof it generates a better part of its needed heat by renewable energies; only about 25 to 30 percent need to be delivered by a gas boiler." (Tagesspiegel, 2010*; see also DBZ, 2010)

Thereby, it, however, applies to KfW-40 standards (Tagesspiegel, 2010; see figure 16), which means that it is designed in a way that it „needs 60 percent less primary energy per year as comparable newly built houses" (Haus XXL, 2014*).

Figure 16: The Leuchtturm eG's energy demand



Source: DBZ (2010, p. 79); translated From German into English by the author

This could be reached due to "a hybrid construction technique that exists of a ferroconcrete skeleton and a six-centimeter-wide inner surface insulation of loam and cork" (Tagesspiegel, 2010*). This implies that it was ensured

[161] „Thereby two things have not been considered, both [that] the facade at the backside [of the building] entirely consists of glass; and we [they] have underfloor heating and spirals which are not adjustable. I.e. the aparment … the room sizes that we have now, have been determined by the first-time users." (Interview 2005, p. 2*)

[162] e.g. for finances and book-keeping, the garden, organizing parties, … (see Interview 5)

that environmentally-friendly resources were used for construction (Leuchtturm eG, n.d.-a). The Leuchtturm eG, therefore, meets the "criteria of the 'Deutsche Gesellschaft für Nachhaltiges Bauen' (DGNB)" (DBZ, 2010, p. 77*) – the German Association for Sustainable Construction[163]. Hence, environmental standard of the construction is quite high (Interview 5) and above comparable new buildings.

Consequently, the residents of the Leuchtturm eG naturally have got in contact with environmental and energetic issues. However, the interviewee did not see that this has led to a higher environmental awareness and resource-friendly behavior of the community. He rather stated: "We underlie the same laziness issues than most of the other humans, too." (Interview 5, p. 12*) This also reflects in the monitoring and evaluation[164] results, which revealed that planned peak values could not be reached (Interview 5).

Moreover, the Leuchtturm eG is not being active in the field of environmental education or sensitization. Despite initially having had the pretense to be a role model and "signpost for alternative living" (Lee, 2005*) – which is reflected in the cooperative's choice of name (Leuchtturm = beacon, light house) – after construction it has rather retrieved in itself.

Overall, one can state that the Leuchtturm eG has substantial difficulties in living up to its vision. Outstanding benefits could, however, be generated in the area of resilience – particularly against the risk of rising rents. While positive contributions in the area of economy and ecology shall also not be underestimated, future potential is seen in the area of poverty reduction. However, benefits rarely exceed the geographical limitation of the Leuchtturm eG and are rather limited to its members.

[163] see http://www.dgnb-system.de/de/system/version2018/kriterien/

[164] In the building special sensors measure "energy consumption in relation to weather conditions" (DBZ, 2010, p. 78*).

3. Case Study: Berliner Stadtwerke

Picture 3: The headquarter of BSW and BWB

Source: own picture

Overview

The Berliner Stadtwerke GmbH (BSW) is a municipal power utility. It is a subsidiary company – ownership of 100% – of the municipal utility 'Berlin Water Services' (BWB) (BSW, n.d.-f) (Interview 7), which in turn is fully owned by the federal state of Berlin (BWB, n.d.). Thereby, the BSW holds the explicit political mandate to contribute to an "economical, ecological and societal development of Berlin" (BWS, n.d.*).

Currently, it is active in the fields of electricity production and provision, however, there are thoughts about integrating other fields of operation into its business model, such as electricity purchasing and trade on the stock market as well as the provision of efficiency solutions for real estate (Beirat der BSW, 2016) (Interview 7).[165]

[165] Integrating grid operation is, at this point, not on the agenda, as it is not expected that conflicting interests with the current grid owner can be solved within the next five years (Interview 7). Also the full integration "of all sections, gas, electricity, [mobility,] sewage, water" (Interview 7, p. 5*) – in one municipal utility is not being foreseen, as it historically is being divided out among several municipal utilities in Berlin – the BWB, that takes care of the water, the 'Berliner Stadtreinigungsbetriebe' (BSR), which is responsible for waste management, the 'Berliner Verkehrsbetriebe' (BVG), which deals with the transport system, the 'Berliner Bäder-Betriebe' (BBB), which runs the swimming pools in Berlin, and so on (Interview 7).

> "In the business segment of electricity generation we [they] invest in the installation of facilities for a decentral production of renewable energies. These are photovoltaic facilities, however, also block heating power stations and wind energy facilities are being added." (BSW, n.d.-g*)[166]

Hence, the BSW's energy portfolio entirely builds on renewable energy. This is due to their political mandate which urges them to a "local, close-to-consumer production of renewable energy" (BSW, n.d.-e*). In the field of electricity provision and distribution, they currently mainly work with the instrument of the so called tenant electricity model (BSW, n.d.-g).[167] Thereby, the utility installs solar panels on roof-tops – which they lease[168] – and directly provides the tenants with electricity from their roof. "The locally generated electricity is being complemented by electricity, produced by renewable energies, from the 'Berliner Stadtwerke' via the grid." (BSW, n.d.-b*). Currently, the BSW provides 7,000 households in Berlin with green electricity. It, however, already generates an amount that would be sufficient to supply for 17,000 households[169]; and further facilities are being added (Interview 7).

The BSW was founded in 2014, after a long process of re-municipalization (Interview 7). Formerly – and since the end of the 19th century –, the municipal company 'Berlin Municipal Power Utility' (BEWAG) was responsible for power and gas provision in Berlin.[170] However, over the time, the city of Berlin sold more and more shares of its utility and, in 1997, eventually sold it to a consortium of investors[171] – for 2.9 billion DM they took over 50.8% of the company (Schumann, 1997). In 2001, E.ON – who back then held most of the stocks – decided to sell its shares to the HEW – which later transformed to Vattenfall (Rtr & Vwd, 2000; Strom-Magazin, n.d.-b). In the same year, also the share-taking US enterprise sold its part to Vattenfall, so that the Swedish state-owned enterprise held about 90% of the shares (N-tv, 2001). Ever since, Vattenfall has been the main player in Berlin's power and gas market.[172]

Then, in 2011, the 'Berliner Energietisch'[173] (Berlin energy roundtable) founded, a „broad and party-independent coalition of NGOs and citizens" (Stalder, 2016, p. 274*). Inspired by the successful re-municipalization of Berlin's water provision utility, as well as successful re-municipalization

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[166] While block heating power stations and photovoltaic are directly being installed in the metropolis Berlin, the wind mills are situated in the urban hinterland (Interview 7) (BSW, n.d.-g).
[167] "Currently (october 2017), we [they] have closed deals for more than 134 solar power facilities. Among them are 69 tenant electricity facilities which are located, among others, in Pankow, Hellersdorf, Steglitz, Hohenschönhausen or in Berlin Mitte." (BSW, n.d.-e*)
[168] The photovoltaic panels installed, however, belong to the BSW (Interview 7).
[169] On the internet it says, that the wind energy facilities alone already provide for 20.000 households (BSW, n.d.-e).
[170] It further was active in the field of grid operation.
[171] The purchasers were the 'Veba' and the 'Viag' – that later merged to E.ON – as well as the US company 'Southern Company' (Schumann, 1997).
[172] Also in grid operation: "In the course of liberalization and a wave of privatization of the 1990s, the federal state of Berlin sold its electricity grid via [newly] assigning the grid concession. Berlin's electricity grid is now in the hands of the Vattenfall Europe AG." (attac, Bürgerbegehren Klimaschutz & PowerShift, 2011, p. 3*)
[173] see http://www.berliner-energietisch.net/ueber-uns

attempts in Schönau, Hamburg and co, also in Berlin ideas of re-municipalizing energy provision had risen (Interview 7) (attac, Bürgerbegehren Klimaschutz, & PowerShift, 2011). In 2013, this had then resulted in a referendum, where Berlin's citizens could vote for the re-municipalization of its energy provision. About 600,000 citizens – 83% of the participants – voted with 'yes', which however meant that the necessary quorum of 25% was marginally missed (Interview 7) (Stalder, 2016).[174]

Still, the Berlin senate, being urged by the resolution of the city parliament of 2013, decided to re-launch the operation 'Berliner Stadtwerke' (BSW, n.d.-d).[175]

What is new and how new is it?

The BSW can be regarded as alternative in the sense that it brings in new economic and organizational logic to Berlin's power market. It breaks up with the power oligopoly of the dominating power enterprises – and Vattenfall in particular – and further substantially deviates from other privately organized energy providers, like GASAG, due to its municipal structure. As it is to 100% owned by the municipal BWB it, thereby, also differs from other municipal utilities, which are partially owned by the 'Big Four' (Interview 7). Furthermore, it is novel, that the BSW was specifically created, as "innovator, who, beyond the technological and methodical innovations in the field of energy efficiency and renewable energies, becomes a forerunner for a sustainable civil society with many decentral solutions" (Beirat der BSW, 2016, p. 1*) and, therefore, aims at finding new solutions and products (see Interview 7) instead of sticking to the limits of the conventional business field of power provision. Consequently, despite re-municipalization being not a new phenomenon, the BSW transcends the innovativeness of other market actors in several ways and can, therefore, be regarded as novelty – although maybe not as radical one.

For whom does it appear to be novel?

Novelty is, first, appreciated by the city government of Berlin, who initially set up the project. They regard the BSW as "[i]mportant innovative contribution to the realization of the political goal 'climate-neutral Berlin 2050'" (Beirat der BSW, 2016, p. 1*; see also Interview 8). However, also the BSW increasingly finds acceptance in the market (Interview 7). This is first reflected in the fast increase in client numbers, however, as well as by the interviewees' perception that the power competitors feel increasingly daunted by the BSW. Or as the interviewee stated: "They are afraid of us, they know, that we have real power." (Interview 7, p. 10*)

[174] only 24.7% of Berlin's electorate took part

[175] maybe due to the fact that the referendum was that close to success; but certainly because Berlin obliged itself to be carbon neutral in 2050 (see chapter IV.5.1.)

By whom has it been triggered?

As lined out before, the (re-)set-up of the BSW has been a political decision and not an entrepreneurial one, and consequently constitutes a top-down innovation (Interview 7; Beirat der BSW, 2016).

> "It has been political will, to find an instrument that could support the political aim to be carbon-neutral in 2050. Well, and a municipal utility is supposedly just the right thing for that." (Interview 7, p. 2*)

However, it has also been shown that the initial idea had developed bottom-up and was expressed via a union of civil society organizations, the 'Berliner Energietisch'.

Processual stage in which it is situated?

Due to the fact that the project has just started in 2014, the BSW is in many ways still in the phase of experimentation and invention. As mentioned before, it has established successfully in the market, however, in its mandate to find ways to contribute to societal development it is still rather at the beginning. In this regard, the interviewee stated: "Well, we know where we wanna go, yes, but we are still far from being there." (Interviewee 7, p. 5*)

Normativity Gains?

As mentioned before, the BSW has received the political mandate to contribute to an "economical, ecological and societal development of Berlin" (BSW, n.d.-f)*. The fact that the BSW is still just at its very beginning makes it difficult to provide information on its actual normative contributions. In many areas – and the social ones in particular – the interviewees have detected certain entry points, while the respective solutions are, however, still in development and, thus, currently absent (see Interview 7).

Reduce Poverty and Increase overall Living Standard

As energy provider the BSW has a certain leverage when it comes to the topic of energy poverty. In its position paper, the 'Enquete-Kommission Neue Energie für Berlin' (inquiry commission new energy for Berlin) mentions that power utilities in Berlin are confronted with the challenge to find socially-acceptable ways to reach the goal of a climate-neutral Berlin in 2050 (Flämig, 2017). Here, the affordability of clean power plays a crucial role. The BSW makes a first contribution by providing tariffs – about 25 till 26 cents per kWh – that are substantially lower than the basic tariff (BSW, n.d.-b), as well as compared to the average tariff in Germany that currently fluctuates around 29 ct/kWh (Heidjann, 2018). The lower tariff is – among other factors – possible due to the fact that grid costs are actively tried to be avoided, by focusing on the development of in-site power generation (Interview 7) (BSW, n.d.-a, n.d.-g).

Increase Human Health and Well-being

In this context, the interviewees expressed the will of the BSW to find solutions and products that make life for the people easier. They stated: "[W]hat we wanna be: Life-relevant to the citizens of this city." (Interview 7, p. 5*) However, so far, products or solutions are being absent.

Reduce Inequalities and Foster Social Cohesion

In the context of social cohesion, the interviewees several times mentioned that municipal utilities provide a certain opportunity to empower people to take part in and benefit from the energy transition. In this regard, it got the explicit task from its advisory board to take a "pioneer role for the strong integration of civil society" (Beirat der BSW, 2016, p. 1*). So far, efforts of the municipal utility concentrate on the tenant electricity model. Accordingly they state: "That is our ideal. We install a PV [photovoltaic] facility on an apartment house and eventually all tenants in the house have a stake in it." (Interview 7, p. 7*) They further describe how this can lead to the building of networks in the house. Ideally, they would like to lift this effect on a bigger scale by increasingly providing quarter solutions.[176] However, these kinds of effects are so far rather speculative, due to the project's short term of operation. Nevertheless, the application of the tenant electricity model itself enables a certain group of people – who so far have been excluded from participating in the energy transition, namely tenants – to finally take part in the energy transition (BSW, n.d.-e, n.d.-g). It thereby exerts a socially including effect.

Furthermore, by offering 'berlinStrom Sonne+', a kind of all-inclusive package (see BSW, n.d.-b),[177] it substantially lowers the hurdles[178] that prevent people – and low-income groups in particular – from having their stake. In this regards, also further potential has been identified, when it comes to the empowerment of people (Interview 7). The interviewees stated: "They are […] your [our] clients, but also citizens whom you explain energy; whom you suggest, what they are able to do with their PV facility on the roof." (Interview 7, p. 7*) Hence, the tenant electricity model provides the BSW with an entry point to motivate people to get in contact with energy and environmental topics that so far have not been interested in that or felt that the topic is too complicated (Interview 7).[179] So far, the BSW, however, only exerts this effect, when installing PV panels in tenant

[176] Here, rather block heating power stations constitute the technological solutions, but also solar power (BSW, n.d.-g).
[177] The BSW leverages the investment for the solar panels and takes care of the optimal combination of energy from the roof-top with energy from the grid, while clients can to continue to pay in the easy form of tariffs.
[178] particularly by keeping the financial hurdle low
[179] "It presupposes an entirely different knowledge-level [about] what energy actually is and what kind of influence that has in your life. That means you actively need to engage in that" (Interview, p. 5f*).

electricity projects. Certain consultation, education or training offers, are absent at this point.[180]

Also other participation opportunities, like civil shareholding in the BSW itself or project-related civic participation (Beirat der BSW, 2016; see also Berlo and Wagner, 2015), have not been in place so far. However, the interviewees reveal that there is currently something in the pipeline (Interview 7).

Empower Women and Girls

No particular information was given on the gender topic. It is therefore being expected that their opportunities to contribute to gender empowerment are, currently, not perceived or being in the focus.

Promote Inclusive Economic Growth

One of the utility's specific political tasks was to contribute to economic development in Berlin. With the provision of its regional electricity product 'berlinStrom', the BSW has already found a successful way to do so (Beirat der BSW, 2016).

> "berlinStrom is directly generated, where it is being consumed. Construction, maintenance and operation of our facilities is being organized predominantly with companies from the region." (BSW, n.d.-b*)

Thereby, both their power generation in Berlin, as well as the promotion of local enterprises – medium-sized ones and craftsmen in particular – is creating local added value and, hence, fosters the local economy of Berlin. Furthermore, the BSW re-invests potential yields in power projects in the region (BSW, n.d.-a) – instead of distributing it among its (foreign) shareholders – and thereby keeps the local money flow upright (Interview 7).

Furthermore, the interviewees mention that, due to their positive image – "regional, municipal, close-to-the-client, decentral; all of this is being attributed to us" (Interview 7, p. 3*) – the BSW benefits from a leap of faith, from the side of the citizens (Interview 7). Acceptance for the implementation of power projects by the municipal utility is therefore potentially higher, which implies that its investment risks are lower.

Besides that, the BSW can also benefit from other cost-saving effects. "Due to the generation on-site we [they] avoid expensive grid expansion and, thereby, additional costs." (BSW, n.d.-b*) This avoidance of upstream grid infrastructure, further resembles in lower power tariffs (BSW, n.d.-a).

Eventually, the interviewees mention that – in the long-run – the BSW is expected to positively contribute to Berlin's public budget. "We have to generate profit. […] City return is the announcement – it has to revolve –, they don't donate us anything." (Interview 7, p. 6*) However, so far the company still relies on its substantive start-up financing (Interview 7). Still,

[180] It, in turn, forwards clients to the 'Verbraucherzentrale Berlin', in order to obtain energy consulting; see http://www.berlinerstadtwerke.de/energieberatung/.

the interviewees make clear: “But we don’t burn this money, we invest it. This is always linked to return.” (Interview 7, p. 4*)

Foster Resilience

Despite the popularity of the issue of security of supply, increasing resilience does not seem to be in the focus of the BSW. It is only being considered in the context of the tenant electricity model. Here, it is being highlighted that the BSW does balance energy short-cuts, during night or windless times, with certified electricity from the grid in order to guarantee security of supply (BSW, n.d.-c). It is, however, overlooked that, with increasing decarbonization attempts, Berlin will get more and more dependent on renewable energy input from its surroundings or the transmission grid. Indirectly – and seemingly unconsciously –, it however counteracts this development by promoting the installation of in-site power generation – via the focus on roof-top photovoltaic and basement block heat power plants (Interview 7).

Protect and Restore Ecosystems and Biodiversity

The most direct environmental contribution of the BSW lies within its decarbonizing effect, as it only generates renewable energy (Interview 7). “With our [their] projects and facilities 28,500 tons of CO2 are being avoided every year.” (BSW, n.d.-e*) By this means, the BSW contribute step by step to the realization of Berlin’s goal to become carbon-neutral in 2050 (BSW, n.d.-d). In this regards, the BSW considers itself as implementing realizer of the energy transition (Interview 7).

Due to its strong focus on roof-top PV and basement block heat power stations (Interview 7), it further keeps its land-use footprint rather low. This however, so far, seems to be a rather disregarded factor though. Also the effect might be diminished in future, as the BSW is increasingly looking for potential locations for wind parks in the surroundings of Berlin (BSW, n.d.-g).

As mentioned before, the BSW also sees its responsibility to empower people to engage with the topic of energy transition. In the environmental context, they see the opportunity that the BSW could sensitize the people to recognize that without them the energy transition will not be feasible. Here the BSW sees its task in developing products, which make it as easy as possible for the clients to behave environmentally responsible (Interview 7). Their rather cheap power prices are a first step in this direction. Further solutions are, however, still absent.

The BSW’s positive contributions mainly result from its local value generation and its focus on on-site power generation and the tenant electricity model in particular. Other benefits are possible to be exerted in future, when the BSW manages to find the solutions to the tasks detected. Thereby, it has to be noted that the exerted contributions have a vast transmission effect, as first the BSW already comprises 7,000 clients, and

second, via the local value generation effect as well as due to their municipal ownership, indirect effect can be even more profound.

4. First Results

The analyses of the three case study projects ufaFabrik, Leuchtturm eG and BSW proved that they cannot only be regarded as alternative power initiatives in the sense that their applied innovative combination of technical solutions and socio-economic concepts (new combination of knowledge and resources) silhouettes them against conventional power projects. Furthermore, they proved to generate several normativity gains in the way that they often tackled social, economic and environmental challenges at the same time. They can, hence, be regarded as socio-ecological innovations as lined out in chapter III.5.2.

Still it has to be noted that extent and quality of benefits differed substantially. This can, on the one hand, be explained due to the fact that the projects were different in kind. While the municipal power utility particularly contributed to promoting a local and, hence, inclusive economy, the Leuchtturm eG's strength mainly lay within its creation of stable rents and, hence, increasing long-term resilience of its inhabitants. However, also between the ufaFabrik and the Leuchtturm eG – which can both be regarded as co-housing projects – several differences could be detected. They were most striking in the fact that group dynamics currently decrease the Leuchtturm eG's well-being, while in the ufaFabrik the community and familial atmosphere contributed rather positively. Also, the Leuchtturm's benefits tend to be limited to the cooperative itself, while the ufaFabrik actively tries to integrate externals into their project, particularly via their established neighborhood center. This implies that positive contributions are not inherent to the concepts themselves, but rather depend on project-specific interpretation and implementation as well as the motivation of their members. Here, it shall be mentioned that the ufaFabrik potentially benefits from its long-term operation and has already reached another level of expertise and self-confidence, while the Leuchtturm eG still struggles with exhaustion after its construction phase. Consequently, also the processual stage of an initiative exerts influence on a project's contributions to city development. Moreover, it got clear that the opening of projects to the outer world is not natural but can exert a bigger leverage on sustainable city development and should, therefore, be fostered (see also Interview 3). Hence, all projects proved to be socio-ecologically innovative in their own way. The differences in extent and quality and the Leuchtturm eG's difficulties in living up to its vision, however, also made clear that a case-by-case analysis of other alternative power initiatives cannot be omitted in order to find out what their specific potentials are.

Other lessons learned are, that the ufaFabrik and the Leuchtturm eG successfully established projects in a bottom-up way and, in the beginning, creatively and also to a wide extent autonomously solved a diverse range of problems that they were confronted with. Looking at the land question for

instance, the ufaFabrik took the way of peaceful occupation and further kick-started the project by collectivizing individual property and building on manpower. The Leuchtturm eG, in turn, found itself support by the trias foundation and grouped as cooperative as well as by inventing the 'rucksack' principle managed to buy and build their desired equity. Civil society should, therefore, be regarded as competent problem-solvers (see Mulgan, 2006) and in this sense as entrepreneurs and innovators. On the other hand, also the BSW, which in turn established in a top-down way proved to be an innovative entrepreneur and being highly motivated to develop new solutions. Hence, also cities can be innovative themselves.

5. Innovation Management in Berlin

As shown in the last chapter, alternative power initiatives developed novel solutions and contribute positively to Berlin's sustainable development. The question remains how the socio-ecological innovations can systematically be fostered. This shall be clarified by applying the innovation management approach (see chapter III.3.) to the city-context of Berlin.

As mentioned before (chapter III.4.), cities command over a variety of roles and instruments that can be applied to foster and support innovation. Thereby, it has to be noted that the city of Berlin is not only a municipality but further a federal county and in this sense. On the one hand, its possibilities sometimes even exceed the ones of an ordinary city government, on the other hand, this can also constitute a challenge. The city steering of Berlin is split among the Senate – which administers on county level – and several district administrations. In this paper, special focus shall be lain on the county-level as, here, city-wide leverage is being situated. When talking about the city of Berlin it is, therefore, being referred to the county government, parliament and/or senate administrations, respectively.

5.1. Willingness

On the institutional level, readiness was the first dimension to be looked at. It asks whether the entrepreneur – in our case the city of Berlin – managed to create inner-organizational motivation for change and innovation (see chapter III.3.). In this context, the city of Berlin seems certainly ready to foster innovation (Interview 8). It is an explicit goal of the city to support the creative potential and special start-up scene, for which Berlin is nowadays internationally famous (Interview 8 and 6) (BerlinPartner, n.d.-a). The city does, thereby, not only acknowledge its responsibility in managing innovation, but further also introduced several frameworks in which innovation plays a central role.

In 2011, Berlin – together with the county of Brandenburg – worked out a common innovation strategy called 'innoBB'[181], which shall help to transform the greater "capital region into an internationally competitive niche for innovation" (Wirtschaftsförderung Brandenburg, 2017b*). In the forehand, both counties have identified sectors, that they considered inheriting most promising potential to be developed further, and from this evaluation they derived five areas for management focus: 1) traffic, mobility and logistics, 2) energy technology, 3) information and communication technology (ICT), media and creative economy, 4) health care economy, and 5) optics and photonics (Interview 8) (Wirtschaftsförderung Brandenburg, 2017a, 2017b). Execution of the innovation strategy was, thereby, forwarded to Berlin's economic development agency 'Berlin Partner' (Interview 8). Focus as well as implementation assignment, however, indicate that Berlin's innovation management strategy strongly focusses on managing rather technical innovations and the promotion of classical entrepreneurs, such as (international) companies and start-ups – but also research institutes (Interview 8; Wirtschaftsförderung Brandenburg, 2017b).

However, also other strategies highlight Berlin's will to foster innovation. First, since the adoption of the 'Berlin Energy Transition Act' (EWG Bln – Berliner Energiewendegesetz), in 2016, Berlin legally established its path to become climate-neutral by 2050. Ever since, the 2050-goal has been one of Berlin's overall guiding principle – if not the guiding principle – for all its climate and energy relevant decisions. One year later, the goal-orientated law had been translated into the 'Berlin Energy and Climate Protection Program 2030' (BEK 2030 – Berliner Energie- und Klimaschutzprogramm 2030), which "contains concrete strategies and measures for the way to climate-neutrality and, therefore, constitutes the 'roadmap' [...] for Berlin's energy and climate policy." (SENUVK, n.d.*)[182] Thereby, innovation management is one of the BEK's central instruments of implementation:

> "In the width of the [detected] fields of action it is being attempted to improve and foster the framework conditions for (mainly) voluntary climate protection activity. [...] It is being attempted to stimulate and promote, by positively influencing many minor and major 'set-screws', climate protection activity and adaptation measures in the city, in order to foster innovations and business models, spark sub-markets and change behavior." (SENUVK, 2018, p. 27*)

Despite it also rather focusses on technical innovations, willingness to promote novel 'business models' is being expressed, which provides entry-point also for the promotion of social innovation. It further identifies climate protection and energy transition as cross-cutting issues that can only be dealt with cross-sectoral and multi-level – not to say transdisciplinary (SENUVK, 2018).

[181] see http://innobb.de/sites/default/files/downloads/gemeinsame-innovationsstrategie-der-laender-berlin-und-brandenburg-innobb-372_0.pdf

[182] Since, the beginning of this year there now is an updated version of the BEK, see: https://www.berlin.de/senuvk/klimaschutz/bek_berlin/download/BEK-2030-Beschlussfassung.pdf

Beyond that, the city of Berlin strives for becoming a 'smart city' and for that reasons has adopted the 'Smart City Strategy Berlin'[183] (Smart City Strategie Berlin), in 2015 (SENWEB, n.d.*).

> "Smart City is a holistic consideration of all future-orientated topics, with which we have to deal with in a metropolis in the next decades. It is about anticipating trends and developments in all sectors that influence life in a metropolis. By making use of ICT it is the task to develop solutions in order to make our city more efficient, healthy, sustainable, livable and clean. Besides civil benefit also climate protection, resource efficiency and sustainability are of crucial importance." (BerlinPartner, n.d.-b*)

However, despite its holistic and integrated approach it still focusses on implementation via technical innovations – in the sector ICT, in particular. Also, the 'Netzwerk Smart City Berlin' "a working group of more than 100 companies, science and research institutes of the city" (ibid.*) takes care of implementing the strategy.

Hence, despite the city of Berlin in many ways has expressed certain will to foster and support innovations, certain focus on technical innovations and conventional entrepreneurs is prevalent. This limits Berlin's overall readiness for innovation to a certain segment, which implies that in competition for support socio-ecological innovations are potentially disadvantaged. This has also been experienced by the ufaFabrik – despite its comparably well relations to the city:

> "We had fully developed [a concept for] the adjacent harbor Tempelhof. It was withdrawn from us right under our nose by a shopping mall developer. We had the financing and everything ready but they just paid the double and have now built a shopping mall there. And we had planned a lot of innovative things there. Everything that we have had as development in the ufaFabrik was meant to be included there." (Interview 1, p. 5*)

The experts, trace this back to an overall lacking capacity to think integratedly and act coordinately (Interview 3 and 6) (see also Aderhold et al., 2015; IRENA, 2016), which is further affirmed by the representative of the Leuchtturm eG by providing the following example:

> "[N]ext to us there is a children day-care center. It was newly built and finished two years ago. At this time the refugee situation as well as the overall discussion about living are were already at high level, and they just build three stories. Why? There the county of Berlin could have, without Problems, added another story and build low-cost apartments there or what ever. […] We could [have also] made a block heating power station concept with the day-care center and the other two neighbors." (Interview 5, p. 14*)

As has been shown before, socio-ecological innovations are cross-cutting in themselves (see Interview 2, 3 and 6) and would consequently be able to tackle cross-sectoral challenges in a more effective way. Hence, the city of Berlin would need to take a broader understanding of the term innovation as well as a generally more integrative approach in order to improve Berlin's overall readiness for innovation. This requires qualitative human resource management, sensitization and training of staff (Interview 3

[183] see https://www.berlin-partner.de/fileadmin/user_upload/01_chefredaktion/02_pdf/02_navi/21/Strategie_Smart_City_Berlin.pdf

and 6) (see also Aderhold et al., 2015; Disselkamp, 2012; World Economic Forum, 2016), because, as the representative from the BSW detected:

> "The impeding factor is that they do not know what they talk about. Catchword 'digitalization of the city' […]. They drive topics, but when, in the organization of a department, that falls on executing level there is no 'digital natives' but only administration clerks that have worked in the agency for 15 years." (Interview 7, p. 10*)

Also better institutionalization of cross-sectoral thinking is necessary for promoting integrative thinking (Interview 3 and 6; see also Interview 7). For, instance an overarching sustainability strategy[184] could make the connections between the different goals and strategies clearer and, hence, provide guidance and orientation (Interview 3).

5.2. Openness

The next management dimension, on the one hand, asks for the creation of open space and niches so that innovations can develop, but also aims at removing cultural and structural hurdles that make it hard for innovations to proliferate (see Disselkamp, 2012; Rückert-John et al., 2014; Schnur, 2003). Despite the relatively high degree of readiness, in the interviews, the city of Berlin has by majority been classified as rather constituting an obstacle to, instead of a driver of, innovation (Interview 1-7). This is due to several cultural and structural hurdles that prevent innovation from thriving.

Cultural Hurdles

Norms, values, culture and customs can be limitations to innovativeness and innovations when, developments are locked into specific trajectories (see Seyfang and Haxeltine, 2012; Seyfang and Smith, 2007). In the case of Berlin, substantive impeding character is being attributed to Berlin's administration, which is characterized as (a.) being rather stiff, inflexible, and strictly sticking to the rules (Interview 3 and 4). This is of course a certain hurdle for innovations, as, due to their novelty, they tend to not fit into existing structures and regulations (see also Aderhold et al., 2015; Mulgan, 2006). In this regards, the Leuchtturm eG constitutes a very illustrative example:

> "By and large, that was really a novelty that we separated land from building property. That fiscally and notarially led to several problematic processes because […] [t]here was no operating handle for that" (Interview 5, p. 13*).

In this context also the ufaFabrik contact shared his experience:

> „Well, I have contributed to a certain degree to the development of the power plant Mitte […] and there it was about fire protection. That would have costed some hundreds of thousand euros, […] 400,000 € somewhat in this amount. And to implement this … that would have meant the death of the whole plan." (Interview 1, p. 11*; other examples see Interview 4)

[184] Such a strategy should be developed participatory, so that executing institutions and staff's identification with the strategy and, hence, commitment is higher (see Disselkamp, 2012).

Instead of standardizedly objecting such projects, more solution-orientated and innovative administration action would be necessary (Interview 1 and 3).

However, in this regards, administration is characterized as (b.) being rather uncreative and uncommitted (Interview 3 and 4; see also Aderhold et al., 2015), but also as lacking the personnel and time-wise capacity to do so (Interview 3 and 6).

Furthermore, creative administration action is being prevented by the last named cultural obstacle: (c.) a high degree of risk aversion. The city of Berlin is often being described as fearful in trying out new instruments (Interview 2), which impedes optimal innovation management. Also "[i]nnovation is an experimental process, and an important aspect of this is openness to learning from failure." (Seyfang and Smith, 2007, p. 597) Consequently, also administration itself needs to come to an experimental trial-and-error attitude to provide the innovation with certain space.

Hence, Berlin's administration needs to learn to be more flexible, creative, courageous and open to failure (Interview 2, 4 and 6) (Grießhammer & Brohmann, 2015; Pont, van Est, & Deuten, 2016; Seyfang & Smith, 2007) – or become "creativity agents" (Interview 1, p. 11*), as the ufaFabrik contact framed it. Here, again human resource management – with a special focus on rejuvenation – and training could be a first step (Interview 3 and 6; see also Aderhold et al., 2015; Disselkamp, 2012; World Economic Forum), as well as the promotion of already highly-motivated staff (Interview 3).[185] In this context, it could even be thought of providing certain monetary or non-monetary incentives to enhance motivation and commitment (Disselkamp, 2012). However, administration also needs to be provided with more staff and time to be able to be creative themselves (see IRENA, 2016; World Economic Forum, 2016). In order to be more flexible it is usually recommended to outsource some innovation management tasks to agencies (see Interview 2 and 6). This is already the case, since innovation management in Berlin has predominantly been assigned to the agency for economic development 'Berlin Partner' (Wirtschaftsförderung Brandenburg, 2017b) (Interview 8). As shown before, it however concentrates on technical innovations. A respective agency to foster socio-ecological innovations is, in turn, missing.

[185] "Well, sadly we have never really had skilled, ecologically thinking pioneers in administration. […] There has always been individuals that can – let's say – really make a difference. And we have just not had that in Berlin. […] Single people, [yeah], but then only in very detached positions." (Interview 3, p. 7*)

Structural Hurdles

In classical innovation management theory, structural hurdles usually refer to the inner-organization of enterprises. This may be due to the fact that private businesses do not have direct influence on wider framework conditions such as regulatory constraints, markets, funding structures, and so on (see Smith et al., 2005). Here, the possibilities of cities and municipalities go much further. A city can be regarded as system that consists of a rather stable set of "institutions, techniques and artefacts, as well as rules, practices and networks that determine the 'normal' development" (A. Smith, Stirling, & Berkhout, 2005, p. 2493)(see also Seyfang and Smith, 2007) within a city. However, that can be used to create enabling framework conditions but also can constitute a lock-in potential (Rückert-John et al., 2014).

Regulatory Frameworks

In the case of Berlin, certain impeding factor is being attributed to regulatory frameworks. In some cases, problems are not originating in Berlin, as for instance in the case of the national 'Renewable Energy Act' (EEG – Erneuerbare-Energien-Gesetz), which is being characterized as so comprehensive that it exerts overwhelming and, hence, discouraging effect (Interview 3 and 4). However, also several city-specific regulation hurdles have been named. The existence of regulations usually has their reasoning.[186] However, in some cases laws and regulations exist and stay unchanged for quite some time. This means, that they can potentially not apply to current challenges and tasks anymore. In the expert interviews, for instance, outdated water protection regulations (Interview 3) and the example of a denied installation of an ice-storage facility were given (Interview 4). The problem, thereby, is that administration than sticks to the rules instead of questioning them (see cultural hurdles; Interview 3, 4 and 6).[187] Looking at the case study projects, this was the case with Berlin's geothermal regulations. Here, the city decided unfavorably and proved unwilling to change regulation (Interview 4), which, for instance, constituted a certain hurdle to the Leuchtturm eG that wanted to fully exploit its geothermal potential (Interview 5). Here, again more solution-orientated administration action would be necessary. In order to provide the projects with certain space for experimentation, one could also think about temporarily exempting certain regulations in their initial phases (Interview 3 and 4).

[186] Thereby the BSW experiences, particular, disadvantage due to its strong regulation as municipal utility (BSW). "We [they] just have this ambivalent situation that we [they], on the one hand, participate at the competitive market […], and that it is – so to say – determined by the big players. […] And still we [they] somehow have this political agenda […] on the other hand, and somewhere in between we are situated. […] That is a real challenge." (Interview 7, p. 3*) This is, however, a situation that the BSW rather needs to learn how to deal with. Still, reductions of complexity and bureaucracy (which will be lined out in a minute) is certainly something that the BSW would also substantially benefit from.

[187] "And this is of course the greatest hurdle to innovation. If not even really good scientific studies, which are proofed […], can provoke that certain regulations are being changed." (Interview 3, p. 9)

Mostly, it is, however, not the regulations themselves but rather their complexity and depth that constitutes the problem (Interview 1, 2, 5 and 7) – e.g. high construction standards (Interview 5), complex funding application, permission (Interview 1) and bidding processes (Interview 2). In this context, the ufaFabrik contact provided the example of application procedures for construction permits and stated that the application alone already costs some thousand Euros „because one needs an architect, overall planning, a static and, and, and" (Interview 1, p. 13*).

Additionally, processes are being slowed down by high bureaucracy, as being described by the representative of the BSW: "[I]f we then say: 'Ok, come on, let's make a contract!', then it passes all these tables and then this clerk needs to [have a look at it], this advisory body, that expert group, left, right" (Interview 7, p. 11*). All of this implies that processes do not only take long time – which can be very disappointing – but also results in high costs (Interview 1 and 2). This is a particular hurdle for small-scale and grass-roots innovations. In this regards, the city of Berlin would need to reduce complexity or at least provide central and high quality information and consulting services (Interview 4).[188] Also exemptions from regulations for small-scale projects could be thought of (Interview 3 and 5).

Support Landscape

Moreover, also Berlin's support and promotion landscape exerts certain impeding character. Albeit there is a huge variety (see Interview 8) of public – e.g. Berlin-Partner[189], the innoBB cluster management[190], the BEK[191], the 'Berlin Program for Sustainable Development' (BENE – Berliner Programm für nachhaltige Entwicklung)[192], Berlin's 'Separate Asset for Infrastructure of the Growing City and Sustainability Fund' (SIWANA – Sondervermögen Infrastruktur der Wachsenden Stadt und Nachhaltigkeitsfonds)[193], funding by Berlin's investment bank IBB[194] and its start-up financing tool 'Pro FIT'[195] in particular – but also private support mechanisms – e.g. 'Technology Fund Berlin' (Technologiestiftung Berlin)[196], 'Lotto Foundation Berlin' (Lottostiftung Berlin)[197], 'trias Foundation' (Stiftung trias)[198], funding provided by private companies such as Veolia (Interview 8) –, they seem to be sub-optimal (Interview 4 and 6). Either because they are focusing too much on fostering technical innovations – e.g. cluster management, investment bank Berlin (IBB – Investitionsbank Berlin),

[188] Yet again, it has to be noted that the city of Berlin did so in the form of Berlin-Partner that provides information and consulting services (see BerlinPartner, n.d.-d). However, as mentioned before, this structure systemically excludes socio-ecological innovations.
[189] see https://www.berlin-partner.de/unsere-services/
[190] see http://innobb.de/de/cluster-hauptstadtregion
[191] see https://www.berlin.de/senuvk/klimaschutz/bek_berlin/
[192] see https://www.berlin.de/senuvk/umwelt/foerderprogramme/bene/
[193] see https://www.berlin.de/sen/finanzen/haushalt/siwa/artikel.447539.php
[194] see https://www.ibb.de/de/startseite/startseite.html
[195] see https://www.ibb.de/de/foerderprogramme/pro-fit-projektfinanzierung.html
[196] see https://www.technologiestiftung-berlin.de/index.php?id=2&L=0
[197] see http://www.lotto-stiftung-berlin.de/
[198] see https://www.stiftung-trias.de/home/

technology fund –, do not apply to the individual characteristics of the innovations (Interview 6), or because funding landscape, in general, is too confusing and overwhelming. Also the ufaFabrik – which possesses quite some expertise in acquiring funding – expressed the wish for something like a "funding coach" (Interview 1, p. 14)[199] that actively helps them with finding the right support program. Hence, the establishment of central and high quality information and consulting services (Interview 4) is perceived being crucial.

The ufaFabrik further identified a habit change from providing grants – which was very common in Berlin in the 80s and 90s – to providing (low-interest) loans. While this shift to the creation of revolving funding sources is, generally, being welcomed by the experts (Interview 2 and 6), the ufaFabrik rather fears that it implies that one already needs to have capital in order to be eligible for funding (Interview 1).

Infrastructure

The segment of infrastructure probably inherits one of Berlin's central problems. Berlin suffers from very high competition for land and buildings, which leads to rising prices and the problem that innovation projects struggle with finding space for experimentation and to physically implement their ideas (Interview 1, 2, 5 and 8). Cases like the ufaFabrik, where the people who occupied the areal after some weeks were just granted with the right to stay (see chapter IV.1.), seem unthinkable today. Only some decades later, the Leuchtturm eG even had huge difficulties in finding affordable land at all. Accordingly, the ufaFabrik representative stated: "Well, open spaces vanish more and more in Berlin." (Interview 1, p. 11*)

Therefore, intelligent and innovative allocation of land (Interview 1 and 5) – e.g. via applying long-term leasing contracts (Interview 2 and 5), encouraging green tendering and the application of zoning[200] in Berlin's 'Equity Management Agency' (BIM – Berliner Immobilienmanagement GmbH)[201], or experimenting with its right for pre-emption[202] (Interview 2) – would need to be regarded as very central innovation management tool in Berlin. Unfortunately, this leverage has so far not only been rather disregarded but, also here, land assignment tends to favor classical entrepreneurs and investors (see the ufaFabrik's experience in the case of the harbor 'Tempelhof', chapter IV.5.1.). Another tool could be the creation of a kind of co-working space or innovation hubs for socio-ecological innovations (Interview 3). Yet again, respective infrastructure for technical

[199] Ideally this person or institution could then further assist the project in applying for funding, because funding processes are perceived as very complex (see regulatory hurdles; Interview 1 and 6).
[200] Which was, for instance, successful applied in the bidding process of the 'Schöneberger Linse' (Interview 2); see https://www.berlin.de/ba-tempelhof-schoeneberg/politik-und-verwaltung/aemter/stadtentwicklungsamt/zukunft-planen/gebietsentwicklung/artikel.443609.php.
[201] see https://www.bim-berlin.de/
[202] This is, for instance, being tried in the city district governance of 'Kreuzberg' (Interview 2).

innovations is a wide-spread phenomenon in Berlin – e.g. Factory Berlin[203], infraLab[204] as well as Microsoft's planned Start-up center (Interview 8) – while common space for other innovation types is missing. In this regards, Prof. Walk (Interview 3) brought up the idea to use the already existing infrastructure of the so called 'Futurium – House for Future' (Futurium – Haus der Zukunft)[205] in this regards. Also, the inclusion of projects in research programs would provide them with space for experimentation (see later sub-chapter open space).

Market Structures

Moreover, market structures were identified as hurdle. In energy economy there exists a variety of diverging interests[206] and regime players – the 'Big Four' in particular – are eager to keep their monopolistic power structures in the sector (A. Smith et al., 2005)(Interview 3). They do not have interest that new players enter the market and consequently try to close it down (Interview 2, 3, and 7). This has particularly been felt by the BSW, with its strong business focus on roof-top solar power. It experienced that housing companies and cooperatives are often unwilling to lease out their roofs[207]: "Well, there is just no incentive for them. They don't have a problem, they do not need to deliver any added value to their tenants." (Interview 7, p. 8*) Moreover, other market participants have strong interests in impeding the BSW to gain comprehensive access to roof-tops but also quarters.

> "There is market participants that do definitely not want that. Of course! A tenant electricity product is a totally different commitment than an electricity contract for 12 months. The tariff is super good and the people do not have any incentive to change [...]. And this is a real problem for competitors. They will sorrowly take care that these markets are being closed" (Interview 7, p. 7f*).

Structurally conflicting interests are therefore a certain hurdle. This is being exacerbated by extensive lobbyism, which is being facilitated by historically close relations into the political sphere (Interview 1, 2 and 3; see chapter III.5.1.). "Hence, also here one would need to target this much more and – particularly in the sectors energy and mobility – look at lobby structures and also enclose them." (Interview 3, p. 9*) Consequently, providing for more transparency would be key.

However, current market structure – among other factors due to these lobby structures – orientates at economy of scale (see Seyfang and Smith, 2007) and towards a central power system, while socio-ecological innovations tend to be rather small-scale-orientated, decentral and not fitting to the growth logic (see the cases ufaFabrik and Leuchtturm eG).

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[203] see https://factoryberlin.com/about/
[204] see http://infralab.berlin/about/
[205] see https://www.futurium.de/mitmachen/futurium-lab/
[206] For instance, the BSW described how the housing companies do not have any interest in providing their tenants with roof-top solar power, while the BSW's business model is centrally building on it (Interview 7).
[207] Furthermore there is conflict with other use purposes such as roof-top greening or adding other stories (Interview 7).

Thereby, the Leuchtturm eG is confronted with a particular threat. Last week, Germany's Federal Consultation Court (BVerfG - Bundesverfassungsgericht) decided that the so far adducted standard values for real estate tax rating are unconstitutional (Knieling, 2018). New regulation proposals tend to orientate at property value. An according amendment would certainly hit the Leuchtturm eG. Due to their location in an upscale quarter of Berlin, the Leuchtturm eG would need to pay a much higher amount of property tax, whereby its counter-acting contribution to real estate speculation would stay un-considered (Interview 5). Here, the city of Berlin could make use of its advocacy power, so that exemptions for projects orientating towards community value are include in the new regulation. In general, one can say that the city of Berlin would rather need to come to a neutral position instead of choosing sides, while simultaneously providing e.g. certain regulatory exemptions that foster small-scale projects (Interview 5), in order to create a level-playing-field. In the specific case of the BSW it could, further, support the project by fostering the roll-out of tenant electricity models by providing incentives for house owners to apply access to their roofs.

Inner-organization of Innovation Management

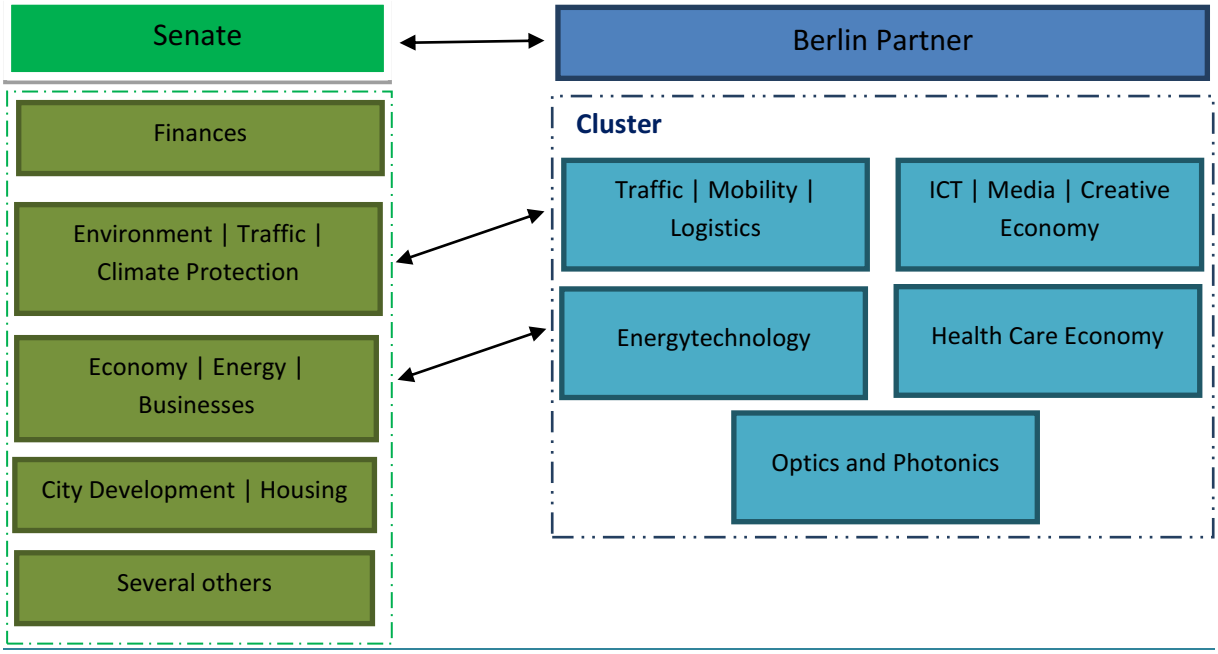
Eventually, it shall also be looked at the structural organization of innovation management in Berlin. As mentioned before, the city of Berlin has outsourced innovation management to the economic development agency 'Berlin Partner für Wirtschaft und Technoplogie' (Berlin Partner) that commands over five innovation clusters (BerlinPartner, n.d.-c) (Interview 8).[208] The economic development agency is „to one hundred percent publicly financed and, consequently, our [the city's] service provider" (Interview 8, p. 2*). The innovation clusters, in turn, are then steered by cluster managements (see e.g. Cluster Energietechnik Berlin-Brandenburg, 2017), who „work according to masterplans, which were coordinated with the senate administrations but especially between actors of economy, science and politics" (Interview 8, p. 1*). Besides the masterplans, the cluster management is given comprehensive margin of discretion and free space in how to actually exert innovation management.[209] Still, the city government brings in overall political (development) goals via the innovation strategy 'innoBB', dialogue processes, the joint design of masterplans and the introduced monitoring system (Interview 8). Also, the clusters are coupled to the senate administrations – respective to their subject area. Accordingly, the cluster of 'energy technology' holds closest relations with the 'Senate Administration for Economy, Energy and Businesses (SENWEB -

[208] Furthermore it coordinates action with the economic development agency of Brandenburg (WFBB) (Interview 8).

[209] The activities of the cluster management comprise: "Innovation management and technology transfer; competency and site marketing; targeted information and active connection of cluster actors […]; identification of development of synergies between clusters; exchange of knowledge and experience; [and] support in topics like internationalization and securing experts." (Cluster Energietechnik Berlin-Brandenburg, 2017*)

Senatsverwaltung für Wirtschaft, Energie und Betriebe). "Hence, we [they] are actually well interlocked, technically, but have, so to say, [located] the expertise in the economic development agenc[y]." (Interview 8, p. 2*; see figure 17)

Figure 17: Organization of Innovation Management in Berlin



Source: own illustration

However, as innovation management is a cross-cutting task (see Disselkamp, 2012) – particularly in the field of energy and sustainability transition, which constitutes a cross-sectoral issue itself –, and as has been shown before, also other institutions have a stake in Berlin's innovation management. With regards to content, certainly the respective senate administrations – but also district administrations, particularly in the field of construction permissions (Interview 1 and 5) – in some way act as innovation managers. As the observed initiatives target many different areas, they hold links to several departments at the same time. However, the SENWEB[210] with its climate and energy program BEK, the 'Senate Administration for Environment, Traffic and Climate Protection' (SENUVK - Senatsverwaltung für Umwelt, Verkehr und Klimaschutz)[211] with its sustainable development program BENE, and the 'Senate Administration for City Development and Housing' (SENSW - Senatsverwaltung für Stadtentwicklung und Wohnen)[212] show greatest thematic overlaps. Beyond that, also other public institutions such as SIWANA, the IBB as well as the BIM have been mentioned before. Additionally, the BSW – besides being a socio-ecological innovation itself – can be regarded as central part of the innovation management structure in Berlin, which was even expressed by the city contacts themselves (Interview 8). Hence, Berlin is an "enormous,

[210] see http://www.berlin.de/sen/web/
[211] see http://www.berlin.de/sen/uvk/
[212] see http://www.stadtentwicklung.berlin.de/

heterogeneous system" (Interview 8, p. 14*) in which many players have a potential stake in innovation management. The task, thereby, is to coordinate these diverse bodies effectively.

In the field of technical innovation this has been successfully solved by creating the institution 'Berlin Partner' and the sub-ordinated cluster managements. A respective institution for fostering socio-ecological innovation is missing and so it stays the task of the scattered departments and institutions to support them. In this context, the city contacts mentioned, that under the heading 'Smart City', well working coordination structures have established:

> "It goes as far, that we [SENWEB] actively seek dialogue, for instance with the senate for city development and living, when it is about big housing projects, and at an early stage try to create synergies" (Interview 8, p. 8*).

The experts have, however, criticized that coordination among the departments is not working well (Interview 3, 4, and 6):

> "Quickly, one comes to the question: Who is taking care of that? And suddenly there is no-one responsible. And if, then it is being squeezed in so that they naturally only deal with it in a very periphery way because they have other core issues." (Interview 6, p. 9*)

Thereby, the BSW interviewee even stated that they sometimes suffer from competency conflicts between SENWEB and, in this case, the senate administration for finances (Interview 7; see also Interview 4).[213] Hence, despite the introduction of the overarching goals to become climate-neutral and smart, administration seems to lack orientation and the capacity to think and act cross-sectoral (see chapter 4.1.).

Creating a certain institution, e.g. a center for socio-ecological innovation[214], could be a first step to tackle this issue (see Rückert-John et al., 2014; Grießhammer & Brohmann, 2015; Rave, 2016). As mentioned before, in this regards Prof. Walk recommends to re-invent the already existing infrastructure of the 'Futurium'.[215] However, her recommendations even go further by encouraging the introduction of a department for sustainability (Interview 3).[216] This approach goes into the direction of institutionalizing cross-sectoral cooperation by the establishment of a cross-cutting department (see Interview 6; Rave, 2016). For the city, however, with the creation of the BSW such an institution was established (Interview 8). Indeed, if designed well, municipal power utilities can, "in a context of transdisciplinary cooperation, pro-actively integrate these diverse worlds of actors on local level" (Berlo & Wagner, 2015, 237).

[213] Also due to different handle in different districts, policy decisions can diverge district-wise and this can create Berlin-internal disadvantages (Interview 4).
[214] Here, it shall be referenced to the 'Office of Social Innovation and Civic Participation' that exists in the US and which is directly linked to the White House (see Rückert-John et al., 2014; Grießhammer & Brohmann, 2015)
[215] An according structure could then not only be designed interdisciplinary but also opened to the public (Interview 3 and 6).
[216] According to her, the fact that such an institution is missing, proves that sustainability is not a priority in Berlin (Interview 3).

However, here the BSW still has to prove that it can live up to its mandate (see chapter IV. 3.).

Open Space

If the city of Berlin manages to remove its detected hurdles, it provides open space for socio-ecological innovations to emerge and thrive. As shown above, space is thereby not only meant in a spatial but also in a cultural, (finance) regulatory, market and organizational way.

However, also instruments such as joint research or model projects, real-world laboratories,[217] or regulatory innovation zones (see Grießhammer & Brohmann, 2015; Bauknecht et al., 2015) can be applied to create open space for experimentation. In such contexts, hurdles can be detected easily – and (temporarily) exempted accordingly. They also provide space for the integration of a transdisciplinary range of stake-holders. Just last year, a real-world laboratory project has been launched in Berlin, called 'Climate-neutral Living in Berlin' (KliB – Klimaneutral Leben in Berlin).

> "The project KliB (climate-neutral living in Berlin), together with 100 households in Berlin as well as company- and NGO-partners, wants to locally demonstrate that climate protection – here and now – is possible [...]. KliB is a research project of the Potsdam Institute for Climate Impact Research, which is being supported by the Federal Ministry for Environment [...] (BMUB) [...] and supervised by the project executing organization 'Jülich' (PtJ)." (Potsdam-Institut für Klimafolgenforschung, n.d.*)

Hence, the project applies a transdisciplinary approach that integrates many stakeholders[218] – among them also the BSW. The city of Berlin, however, missed its chance of directly taking part itself. In turn, it is part of the steering committee of the joint research program and so called 'demonstrator' 'WindNODE' (Das Schaufenster für intelligente Energie aus dem Nordosten Deutschlands - Showcase for Intelligent Energy from the Northeast of Germany) (Interview 8) (SINTEG, n.d.). It deals with such diverse topics as ICT, system flexibilization, connection of end customers, market design, demand-side management, quarter solutions, smart city and many more.[219] However, despite touching upon social spheres it concentrates on triggering technical innovation (ibid.). Accordingly, also rather classical entrepreneurs are part of the consortium[220], while civil society actors are left aside. Also with their concept of 'future sites'[221] Berlin takes the right step and provides space for experimentation, however, yet again they are technology-focused. Consequently, in the area of removing

[217] "A real-world laboratory denominates a societal context, in which researchers conduct interventions in form of 'real-world experiments', to learn about social dynamics and processes." (Schneidewind, 2014, p. 7*). The researchers, thereby, agitate between sheer scientific observation and active interference with background conditions (Bauknecht et al., 2015).
[218] see https://klimaneutral.berlin/netzwerk/stakeholder/
[219] see https://www.windnode.de/arbeitsfelder/ueberblick/
[220] see https://www.windnode.de/partner/
[221] see https://www.berlin.de/sen/wirtschaft/wirtschaft/technologiezentren-zukunftsorte-smart-city/zukunftsorte/artikel.109346.php

cultural and structural hurdles and opening up space for socio-ecological innovations, the city of Berlin has certain scope for improvement.

5.3. Capacities

Besides reducing hurdles and creating openness, the provision of direct support mechanisms constitutes the second column of innovation management. In a first step, a project's needs or lack of resources need to be identified; because the demands differ substantially according to the projects kind but also phase in which it is situated in (see chapter IV.4.). Generally speaking, the initiative's needs rotate around a lack of money, time, people, equipment but also knowledge and skills (Interview 6; Disselkamp, 2012).

Money

As in socio-ecological innovations, commercial activity tends to be limited (see case studies ufaFabrik and Leuchtturm eG; see Seyfang and Smith, 2007), financial resources are often based on public "funding, voluntary input, mutual exchanges" (Seyfang and Smith, 2007, p. 591), donations, or membership fees (Aderhold et al., 2015). Many initiatives, therefore, depend on external financial support; first, for the set-up of innovations. The Leuchtturm eG, for instance, needed capital to buy land and to construct its house, while the ufaFabrik needed money for overhauling its areal (see chapters IV.1. and 2.). In both cases, direct city funding in form of grants would have been beneficial, or consultation where to apply for money (Interview 1, 2, and 6). However, also the application of more innovative tools, such as the creation of cost-saving effects – e.g. by providing land to initiatives via long-term leasing contracts (Interview 2 and 5), giving interest-free loans, or including them in research projects (Interview 2 and 4) – could have helped them to establish. Due to lacking support structures or their overwhelming complexity (see chapter IV.5.3.) – as well as their principles of self-government – both, the ufaFabrik and the Leuchtturm eG, found their own solutions to leverage capital (see chapters IV.1. and 2.). The BSW, in return, received substantive front-end financing (100,000,000 €) from the SIWANA fund (Interview 7). At this initial point, financial support, however, constitutes a risk investment (Interview 8). Here, the city of Berlin needs to be open for failure. It successfully does so by increasingly using the instrument of separate assets and funds (see Interview 2 and 6), such as SIWANA (Interview 8).

However, also when having successfully established, further project-related funding might be necessary (Interview 8). As in the case of the ufaFabrik, for instance, who received substantive grants for the restoration of its theatre hall (Interview 1) and today could need support for its new idea: "We currently think about constructing an[…]other house, where new people can move in – young people so that we can secure the projects viability." (Interview 1, p. 3*). The same accounts for the Leuchtturm eG

that thinks about constructing a rear building in order to rent it out to refugees (Interview 5).

That financing is an important instrument of innovation management has already been realized by the city of Berlin: “Money. Well, yeah, that is just really crucial.” (Interview 8, p. 9*) Accordingly a variety of funding sources has been created. However, the structural hurdles which have been detected in chapter IV.5.2. prevail.

Equipment

Furthermore, the equipment of a group or project with certain material and immaterial resources can constitute a challenge. Thereby, main immaterial resources rotate around permissions (see Interview 1 and 5, see also Rückert-John et al., 2014). In chapter IV.5.2. it has already been indicated that complex and over-bureaucratic permission processes constitute a structural hurdle that needs to be resolved.

In the material sphere, in contrast, it is mainly about space, land and buildings that enable projects to meet, experiment and to physically establish their ideas (Interview 2, 3, and 6; see also Aderhold et al., 2015). While in the times when the ufaFabrik formed, it was still rather easy to get – or occupy – land, the Leuchtturm eG almost collapsed due to the land-question (see chapters IV.1. and 2.). As has been mentioned before (chapter IV.5.2.) space is a rare resource in Berlin. All the more, it is important to safe-guard that this space is preferably allocated to innovative projects (Interview 1; see also Rückert-John et al., 2014; Vogel, 2013; Rave, 2016), for instance, via green tendering (Interview 2) or designation of buildings as shared work spaces or experimentation centers (Rückert-John et al., 2014; Aderhold et al., 2015). Despite having realized that the land-question is of crucial importance in Berlin (Interview 8), the city has so far not sufficiently used it as a tool to foster socio-ecological innovation – quite the contrary as shown in chapter IV.5.2.

The BSW, in contrast, has a very peculiar need for space, namely the one for roof-top areas to vastly roll-out their tenant-electricity model. As mentioned before (chapter IV.5.2.), this is however substantially impeded by structural hurdles connected to conflicting interests of market competitors but also indifference of housing companies. Here, the city of Berlin could provide incentives for house owners to open up their roof-tops for solar panel installation.

Time and People

As many alternative initiatives substantially build on voluntary work (see case studies Leuchtturm eG and ufaFabrik) – which is often conflicting with someone’s professional occupation or his or her private and family time (Interview 5; see Aderhold et al., 2015) – a lack of time is detected as

further challenge[222] (Interview 4; see also Aderhold et al., 2015; Seyfang and Haxeltine, 2012; Grießhammer & Brohmann, 2015; Schnur, 2003). Among the case studies, the Leuchtturm eG is particularly confronted with that issue. Accordingly the interviewee indicated: "This [the joint planning and construction of the Leuchtturm eG] was real expenditure of time and I think the exhaustion, when it finally was realized, was as big" (Interview 5, p. 6*) that today the Leuchtturm eG is retrieving in itself and has lost some of its initial spark and spirit. Further is was revealed:

> It was "planned to politically engage in the quarter or be communicatively active. It is not manageable [...]. Already the pretensions in the house, concerning community activities, is far below what the people had imagined." (Interview 5, p. 13*)

Lacking time resource can, thus, constitute a particularly demotivating factor. Here, the city of Berlin has little direct influence. However, it could provide time management workshops to train people in more efficiently using their time but also provide incentives for restoring motivation for engagement – e.g. it could be thought of including voluntary activities in socio-ecological projects in the system of the already existing Berlin pass for engagement.[223]

In contrast, the ufaFabrik is not suffering from problems with the resource 'time'. Due to their peculiarity that they have not only shaped their own living but simultaneously also their working conditions (see chapter IV.1.), engagement does not stay unpaid and motivation, therefore, is potentially higher. However, the ufaFabrik's viability is certainly endangered by a lack of young people (Interview 1). Here, the city of Berlin could substantially help the ufaFabrik by supporting its idea of building an additional house to recruit younger generation and secure long-term sustainability of the ufaFabrik (see sub-chapter 'money').

Knowledge and Skills

Eventually, projects could be limited in the resources 'knowledge and skills'. Thereby missing knowledge could, on the one hand, be traced back to a lack of information (see case study Leuchtturm eG; see also Schnur, 2003) but, on the other hand, to laymen getting active without the necessary expertise and experience to do so (see case studies ufaFabrik and Leuchtturm eG; see also Interview 2). In the field of socio-ecological innovations the necessary expertise comprises of course technical knowledge – e.g. about energy or construction alternatives – but also about regulatory framework conditions – i.e. building standards, funding requirements and so on. While the contact of the Leuchtturm eG was particularly criticizing a lack of technical information (Interview 5), the ufaFabrik rather uttered consulting need with regards to funding possibilities (Interview 1). The general statement,

[222] This can result in the feed-back effect that due to lack of time, only a small group of motivated people is being active, which can lead to their burn-out and consequently to less people being active (see see Seyfang and Haxeltine, 2012; UBA, 2015; Grießhammer et al., 2015; Schnur, 2003).
[223] see https://www.berlin.de/buergeraktiv/anerkennung/berliner-ehrenamtskarte/verguenstigungen-in-berlin/

however, is: The city of Berlin needs to improve its information platforms and consultation structures (see also Interview 2, 3, 4 and 6). Albeit information patterns in Berlin were detected to have increased (Interview 2 and 5) – particularly in the field of community living[224] – it is scattered among the complex innovation management landscape (see chapter IV.5.2.). Hence, a central information center is missing (Interview 4).

Moreover, know-how in business administration and organization, project management and group governance[225] (see Rückert-John et al., 2014; Seyfang and Haxeltine, 2012, Bauknecht et al., 2015, Hauser et al., 2015) are important but often under-estimated skills. This has got particularly clear in the case of the Leuchtturm eG, where group dynamics constitute a central cleavage that has already lead to a separation of the community into several sub-groups (see chapter IV.2.). While, initially, the group had been supported by an architect, who was specialized on accompanying and facilitating decision-making processes in construction groups (Interview 5), since the ending of the construction phase the group suddenly had to deal with managing group processes on their own – seemingly without having the capacity to do so. Here, the city of Berlin could jump in and provide training and workshops in group governance. It should, however, also be thought about offering assistance in conflict management.

In all four cases of resource constraints, facilitating networking and actor integration provides certain leverage effect. Networks constitute a pool of ideas, experience, people, financial and material resources and, hence, a beneficial knowledge and support structure (Interview 2, 3 and 6; see also Rückert-John et al., 2014; Grießhammer & Brohmann, 2015; Rave, 2016). Mutual learning is enabled, synergy effects can be generated and pooled resources can be applied for the benefit of the greater network (Grießhammer & Brohmann, 2015; Mulgan, 2006).[226] This is successfully being demonstrated by the ufaFabrik (Interview 3), while the absence of networking activity in the case of the Leuchtturm eG could explain some of its difficulties. By engaging in networks, the Leuchtturm eG – who revealed that it is not active in networking (Interview 5) – could learn, how other community living projects deal with group governance issues. Berlin's task thereby is to institutionalize space for networking (Interview 3 and 6; see also Aderhold et al. 2015; Rückert-John et al., 2014). Yet again, for technical innovations the cluster management constitutes such a platform (Interview 8), while for socio-ecological innovations a respective institution is missing. Before, the idea to re-invent the existing structure of the

[224] see http://www.stadtentwicklung.berlin.de/wohnen/wohnungsbau/download/wohnen_in_gemeinschaft.pdf

[225] That embarks "maintaining momentum, managing group dynamics, developing the group [...] and the need to build effective links with other actors" (Seyfang and Haxeltine, 2012, p. 390*).

[226] As an example, the transition town movement shall be mentioned, that provides for a global network in order to facilitate knowledge sharing and best practice experience. The network further offers targeted workshops ('transition training') to empower and qualify its members (Seyfang and Haxeltine, 2012; Rückert-John et al., 2014).

'Futurium' has already been mentioned, while also the tool of real-world laboratories opens up (medium-termed) networking opportunities (Interview 3).

A similar cross-cutting effect can be exerted by supporting the projects in public relation and communication efforts, with which their popularity can be enhanced. By this means, potential investors or new members can be recruited as well as supportive networks build up (see Rückert-John et al., 2014). Thereby, communication action should go beyond simple advertisement (Interview 6). With its peculiar instrumentalization of the cultural center in order to promote also their other areas of activity (see Interview 1), the ufaFabrik has demonstrated that creative communication strategies can influence the overall success of innovations. Hence, regular events and festivals – like the 'Wandelwochen'[227] (Interview 6) – could be organized to enhance the projects' visibility within the city. Also their inclusion in research projects provides a basis for public promotion. Moreover, the organization of competitions and awarding of prices is perceived as valuable tool (see Aderhold et al., 2015; Grießhammer & Brohmann, 2015; Rückert-John et al., 2014). In this regards, and in the context of their project 'Discover SmartCity Berlin'[228], the city of Berlin has just recently launched a campaign that asks people to propose projects that are 'Smart Locations in Berlin'[229] (Interview 8). This provides a good opportunity for initiatives to gain visibility. Eventually, if a socio-ecological innovation center was installed, it could further act as communication hub, where events, work-shops and other public-relation-activities take place (see Interview 4).

5.4. Action

Eventually, the question arises whether goal-orientated steering process in Berlin can be identified, hence, whether in Berlin innovation management is happening. The dimension, therefore, provides the bridge to the analysis of the processual part of innovation management. However, first it asks whether there is something like an innovation management – in the institutional understanding. As has been lined out before (chapter IV.5.2.), the institution 'Berlin Partner' can be regarded as central innovation manger in the case of Berlin (Interview 8), while also several other actors are indirectly getting active in managing innovations (chapters IV.5.1. and 2.). The chapters IV.5.1.-5.3. have proved that there is already a lot of management activity.[230] However, also several loopholes have been identified.

[227] see http://bbb.wandelwoche.org/was-steckt-dahinter/die-idee/
[228] see https://www.berlin.de/sen/wirtschaft/wirtschaft/technologiezentren-zukunftsorte-smart-city/smart-city/artikel.668949.php
[229] see http://www.berliner-e-agentur.de/smarte-orte-berlin-gesucht
[230] Still, the contact person of the HWK (Interview 4) sees that the city of Berlin has developed a lot of concepts and ideas, but, that often the step of implementation is missing (see also Interview 6).

Identification

The first step of processual innovation management lies within the identification of innovations. In classical innovation management theory this means, that a company's staff is trying to develop new ideas, e.g. by applying creativity methods (Disselkamp, 2012). Albeit the case of the BSW showed that cities can also be innovative themselves, socio-ecological potential is rather expected to be found externally (see chapter IV.4.). Accordingly, Mulgan states:

> "Some of the most effective methods for cultivating social innovation start from the presumption that people are competent interpreters of their own lives and competent solvers of their own problems." (Mulgan, 2006, p. 150)

The cases ufaFabrik and Leuchtturm eG constitute good examples. However, it has been shown before that the city of Berlin is often overlooking the innovative potential of socio-ecological initiatives by concentrating on fostering technical innovations (see chapters IV.5.1.-3.). Hence, in a first step the innovative potentials that rest within socio-ecological entrepreneurs needs to be acknowledged (Interview 3). In this context one of the experts stated:

> "[S]ome kind of perception is there, but [...] to consider civil society as segment of city development and activity, that would be my wish. And this is not yet enact" (Interview 2, p. 13*).

Accordingly, the interview contacts of SENWEB just referred to start-ups when enthusing about Berlin's innovative atmosphere (see Interview 8).

However, brought up solutions can be quite diverse and Berlin's innovation landscape changes rapidly, so that the administration contacts reveal that they have "by far [...] no overview of everything what is happening in Berlin" (Interview 8, p. 11*). Here, instruments such as organizing competitions or awards proved to be a very valuable tool. By this means projects can be detected easily (see Aderhold et al., 2015; Grießhammer & Brohmann, 2015; Rückert-John et al., 2014).[231] Hence, with its call for proposing 'Smart Locations in Berlin', the senate has proven certain innovation management skill. Another possibility is to launch participatory and open innovation processes[232] (Interview 3; see also Grießhammer & Brohmann, 2015; Vogel, 2013), by which innovative ideas and projects can be co-created or -identified with a broad variety of stakeholders, e.g. in form of transdisciplinary R&D programs (Grießhammer & Brohmann, 2015), future conferences and agencies (Rückert-John et al., 2014), or innovation hubs (World Economic Forum, 2016). Yet, again the infrastructure of the 'Futurium' could be used to institutionalize this idea (see Interview 3).

[231] Due to the introduction of a certain innovation criteria it further provides the first step towards the next phase of selection and can even be used to promote certain projects as well as to reward them with financial support (Arentsen & Bellekom, 2014; Grießhammer & Brohmann, 2015).

[232] In the sphere of technical innovations, this is already happening. The cluster management, together with companies, scientists and politics, identified several 'future topics' and from this derived a masterplan for innovation management (Interview 8).

Selection

After having gained overview of potentially existing innovation projects, some projects need to be strategically selected and prioritized for further support and management (Disselkamp, 2012; Bauknecht et al., 2015; Grießhammer & Brohmann, 2015). Thereby, certain targets need to be defined to evaluate whether the potential innovation contributes positively to their realization. In the case of conventional innovation management by companies, usually focus lies on cost-benefit analyses (Disselkamp, 2012; Hauschildt et al., 2016). However, as lined out before, profit maximization is not the guiding principle of cities (chapter III.2. and 4.) and, therefore, this rather return-orientated analysis tool does not proof sufficient for the case of municipal innovation management. "One [rather] was [...] to ask: 'What are you doing for the city [society]?" (Interview 2, p. 13*) Projects and initiatives should, therefore, rather be screened according to their broader societal effectiveness – as exemplarily intended in this paper (see chapters III.2., 5.2., IV.1.-3.). However, the fact that innovation management has been attributed to the economic development agency 'Berlin Partner' reveals that economic evaluation is still the guiding principle in Berlin.[233] "[A]lso here it would naturally be sensible, that we do not only have lateral thinkers [...] on project and initiative level but maybe also [...] one level higher [...] in the boards of [support] programs" (Interview 3, p. 11*).

Preparation

In the next step, and only then, questions about the economic feasibility, agility, survivability and development potentials of the selected projects are being asked (Grießhammer & Brohmann, 2015). "Sometimes there are good reasons for failure. An idea may be too expensive; not wanted; insufficiently useful; not good enough relative to the alternatives; or flawed by unforeseen side effects." (Mulgan, 2006, p. 156) Hence, on the one hand this requires an inventory of project-specific resource needs (see chapter IV.5.3.); but also of its business plan (see Interview 2). On the other hand, potential cultural and structural hurdles need to be identified (see chapter IV.5.2.).[234]

However, at the end one can say that "formal [...] research or desk analysis" is necessary, "but progress is often achieved more quickly through turning the idea into a prototype or pilot" (Mulgan, 2006, p. 152). Via concepts such as the real-world laboratory, certain constraints can be identified and solved accordingly, so that the projects' viability improves (Interview 3 and 4; see also Bauknecht et al., 2015; Mulgan, 2006). Ideas proof best "in practice and can then be grown, replicated, adapted, or franchised" (Mulgan, 2006, p. 153). It is therefore of crucial importance that

[233] However, each support program has its own principles (Interview 8).
[234] Important is, thereby, to keep potential future developments in mind. Here, methods like fore sight, vision building and scenario planning can be useful (see Bauknecht et al., 2015; Grießhammer & Brohmann, 2015). The cluster management already considers this step via the development of its masterplans (Interview 8).

municipalities provide space and opportunity for testing and experimentation, particularly for projects who are still in experimentation phase (Interview 1, 2 and 3; see Rückert-John et al., 2014; Mulgan, 2006) (see chapter 5.3.).

Realization

In the phase of preparation, certain constraints but also opportunities of the project and of the conditions in which it is embedded are analyzed. However, "many ideas fail not because of inherent flaws but because of the lack of adequate mechanisms to promote them, adapt them, and then scale them up" (Mulgan, 2006, p. 156).[235] Thereby, the case of the ufaFabrik proves that good cooperation between socio-ecological initiatives and the city can be very fruitful (ufaFabrik, Walk), while it is striking that the Leuchtturm eG – that has very little contact to the city – currently rather struggles to maintain its spirit (see chapters IV.1. and 2.). This indicates that "always they [alternative initiatives] can be productive and exemplary, when the municipality says: 'Yes, let's do that!'" (Interview 3, p. 3*) It is therefore Berlin's task to choose the right set and combination of instruments to foster these kind of projects. As cities "work as planners, regulators, tax collectors, financiers, owners and operators of urban infrastructure" (IRENA, 2016, p. 38) but further agitate as role models, as well as consulters and promotors (Rave, 2016; Arentsen & Bellekom, 2014) they command over a broad array of possible instruments and levers. Thereby, the right combination of instruments is very project-specific (Interview 8; see also Rückert-John et al., 2014), which makes it hard to draw general recommendations. In the chapters before (IV.5.1.-4.), however, several Berlins-specific loopholes have been identified and recommendations have been given. So far it seems that the city of Berlin rather focusses on the support part of innovation management but is rather inactive when it comes to reducing detected hurdles and actively creating open space. Thereby, the creation of space has been detected being a key innovation management instrument (Interview 3 and 4).

Reflection

Innovation management does not end with the realization of a project. "[I]nnovation [needs to be regarded] as a learning curve, rather than as the 'eureka' moment of a lone genius" (Mulgan, 2006, p. 154). Over the time, innovation projects and their demands can change, which requires for regular controlling of project development but also of whether the chosen set of instruments has exerted the hoped for effects or continues to be applicable (Interview 4; see also Mulgan, 2006; Grießhammer & Brohmann 2015). That support demands change could be observed in the case of the

[235] In classical innovation theory the final goal of innovation management mostly is to broadly commercialize the innovation and reach a phase of up-scaling. This is in line with a company's pursuit of growth. However, as this is not the goal of municipalities, the up-scalability of innovations should not guide management decisions (Seyfang & Smith, 2007). Municipal innovation management should rather be targeted towards ensuring a project's viability and long-term operability.

ufaFabrik, with its current demand for younger members, as well as in the Leuchtturm eG, with its rising difficulties with group dynamics (see chapter IV.5.3.). Hence, monitoring structures or revision mechanisms could provide useful (Rave, 2016). In this regards, the innovation strategy of Berlin currently is being reviewed and a consolidated version is expected to be launched in the second half of this year (Interview 8). This provides certain entry point for general overhaul.

Moreover, it proved sensible to scientifically and empirically accompany the projects right from the beginning (Aderhold et al., 2015), e.g. via including them in research projects, pilot models, establishing real-world laboratories (Interview 3 and 4; see also Bauknecht et al., 2015). "'Trying out new things must then, however, also mean to abandon ideas after [repeated] trial with bad ending." (Grießhammer & Brohmann, 2015, p. 22) On the other hand, success should also be publicly celebrated and communicated accordingly (Disselkamp, 2012).

Eventually, best practice experiences could be derived and shared in some kind of innovation circles in city networks[236](Vogel, 2013; Rave, 2016). From this, Berlin could benefit in particular, as so far it is rather inactive in innovation networking (Interview 8), while the experts certainly recommended Berlin to being eager to learn from others, e.g. from already rather successful socio-ecological innovation managers, such as Munich, Hamburg and Frankfurt (see Interview 2 and 6).

6. Second Results

Despite Berlin being eager to support and foster innovations, several loopholes were detected. Mainly, this can be traced back to a missing acknowledgement of the innovative potential of alternative power initiatives, while focus on technical innovations is not only being reflected in the created institutions but also in the support and market structures237 in general. The underlying root cause probably is that Berlin has not yet perceived that socio-ecological innovations can substantially contribute to Berlin's overall sustainable development. Accordingly, management of innovation rather targets at fostering Berlin's standing in international competition for companies and qualified employees and, thereby, focusses on its economic development (BerlinPartner, n.d.-d).238 Alternative power initiatives, who tend to be small-scale and orientated at community value, do often not fit to this logic and are, therefore, often overlooked.

[236] e.g. EUROCITIES, convent of mayors, Energie-Cités, ICLEI (Local Governments for Sustainability), … (see Rave, 2016)

[237] Alternative energy projects tend to be rather small-scale and have limited resources and influence potential. Therefore, they are disadvantaged in competing for financial support but also particularly in competing for land. Also they are particularly being affected by high complexities.

[238] It seems that, by having introduced the goal to become climate-neutral in 2050, Berlin is focusing on the technical side of energy transition and has, consequently, overlooked the bigger picture. Hence, there, seems to be a strong correlation between a lacking capacity to think cross-cutting and the disregarding of socio-ecological innovations.

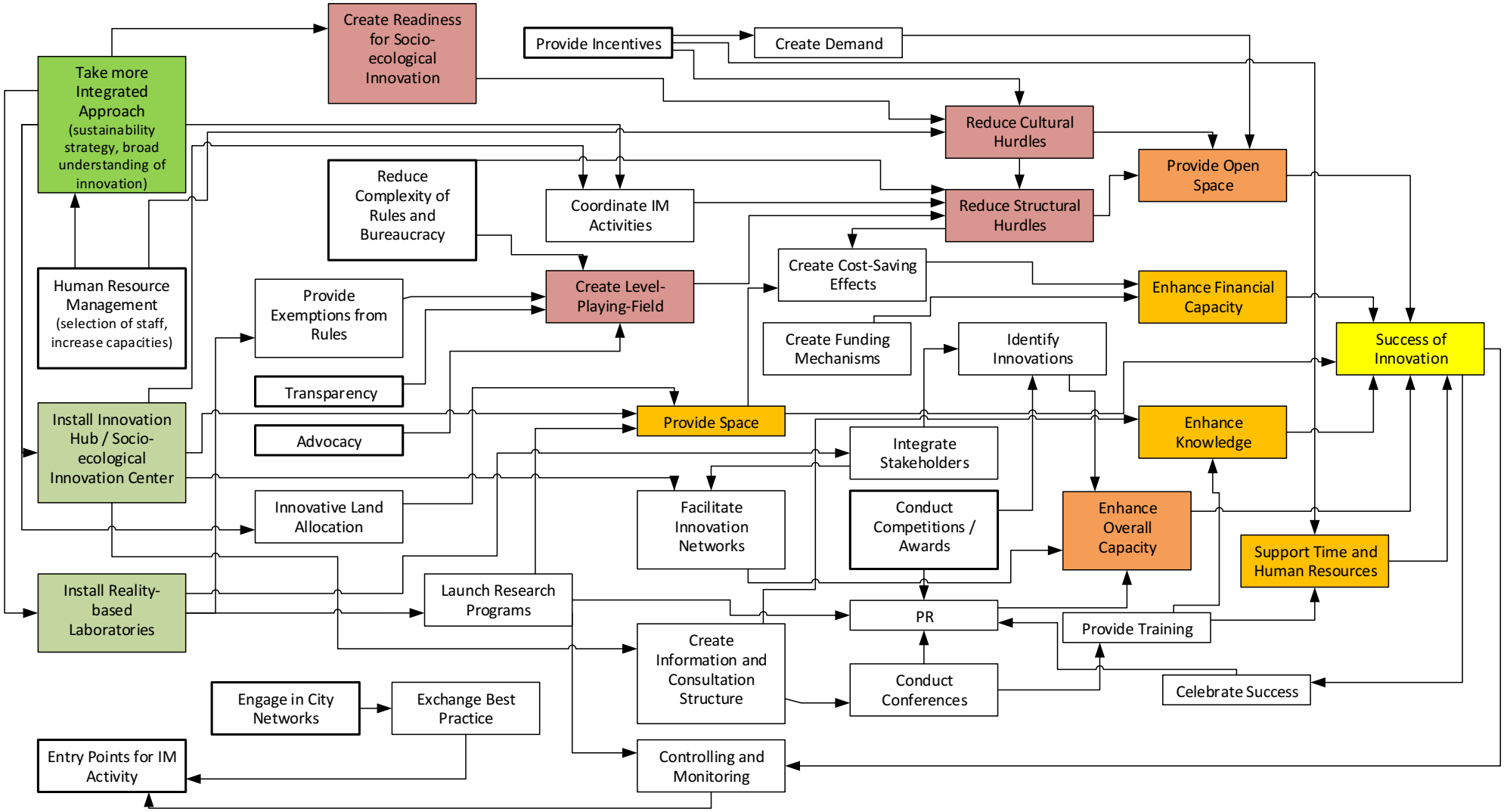
Consequently, besides some funding possibilities systemic management of socio-ecological innovations seems absent.

Berlin, therefore, rather needs to be regarded as a hurdle for socio-ecological innovation instead of a driver. Thereby, the case of the ufaFabrik – in delineation of the Leuchtturm eG, in particular – has shown that well-aligned support mechanisms, but mostly the provision of open space and niches, can be very beneficial or even crucial for eventual success of alternative power initiatives (see also Arentsen & Bellekom, 2015). In this regards it got, however, also clear that support needs to substantially differ from project to project, depending on its kind but also the phase in which it is situated in.

Still, some instruments seem to apply to a diverse range of needs and some even inherit particular synergy potential (see figure 18). This especially applies for the installation of real-world laboratories with which one launches a research program, can hence easily detect hurdles, temporarily exempt them, integrate stakeholders, thereby facilitate networking, and from the beginning installs a monitoring system. Similarly, the creation of a socio-ecological innovation hub could create co-working space for experimentation, foster the coordination of cross-sectoral innovation management, help building up networks, can be used as information center, and as location, where conferences, trainings, and more can be organized. Both should, consequently, particularly be considered when thinking about potential management tools. However, the graph (figure 18) also highlights other entry points and systemic links. Also, it shall be highlighted again that – due to its scarcity – the intelligent allocation is of particular management importance in Berlin.

At this point, it has to be noted that the detected recommendations are Berlin-specific and, hence, not automatically generalizable. Depending on the city one looks at, hurdles, institutional setting and co can differ substantially. Still, the innovation management framework proved to be a useful guideline that could be applied by cities in order to gain overview. This makes the choice of the right set of instruments much easier. The innovation management framework, thereby, always starts with creating readiness for (socio-ecological) innovation. For this, in turn, acknowledgment of socio-ecological innovations is key, which in turn strongly depends on the city staff's ability to think and act integratedly. This is the first task(s) to be tackled.

Figure 18: Recommendations for Strategic Innovation Management in Berlin



Source: own illustration

Legend: Bold Line = Entry Points for Innovation Management (IM); Dark Green = Crucial Tool; Light Green = Tool providing many Synergies; Red = Certain Challenges; Dark Orange = Crucial Precondition for Success; Orange = Resource Needs

V. Discussion

In this paper alternative power initiatives were framed as socio-ecological innovations, in order to highlight their normative and societal potentials. Thereby, one could criticize that this economically-connoted concept does not fit to alternative power initiatives that often specifically oppose common market and growth logic and may, consequently, not identify with the classification 'innovation'. Also, in one of the expert interviews, doubts were uttered that the application of innovation theory could put projects under innovation pressure (see Interview 6). However, at the beginning of this paper it was outlined how the innovation concept has grown out of its economical setting into the social sphere. Also in this paper the broader understanding of the term innovation is being applied. Moreover, it has been lined out, that innovativeness in this work is being understood as contributing to sustainable city development. By this means, it explicitly breaks up with the narrow focus on growth and technical innovations. Also it was highlighted that 'alternative' and 'new' is not meant in a time-related way but rather attributed to the novel combination of socio-economic concepts with green technology, by which they differ from conventional solutions. This qualitative novelty can, therefore, be exerted by several projects at the same time, without having to invent from scratch; so that projects adapting these ideas would still be considered as innovations.

This already touches upon another potential loophole. Inherent in innovation management theory is the idea to create innovations that, at the end, cannot only be successfully implemented, but also scaled-up and diffused. However, up-scaling clearly conflicts with the alternative projects' small-scale orientation and rejection of economic growth (see Mulgan, 2006; Rave, 2016). Therefore, the question arises whether the alternative power initiatives can live up to the urgency and extent of global problems. Looking at energy transition, for instance, it gets clear that the aim to become (almost) carbon-neutral in 2050 (see chapter III.5.1.) is a pressing challenge that may not be feasible without substantial contributions of the 'big players' and top-down efforts. However, it was not the aim of this paper to open up an 'either or pathway', but to contribute to the acknowledgement of underestimated potentials that rest within alternative power initiatives. They may not be able to manage the whole energy transition process on their own, still they contribute to decarbonization and, additionally provide other services that are of societal value. Also, although the alternative power projects can rarely be scaled up, multiplication and transfer is possible.

Despite having located the responsibility on city-level it shall not be denied that, due to their multi-level political embeddedness (see Rave, 2016, Aderhold et al., 2015, Berlo & Wagner, 2015), cities' success in fostering socio-ecological innovation strongly depends on national and European interests and frameworks. First, cities are increasingly being demanded to act as change agents in many ways but according equipment with money and competencies is often missing (see WGBU, 2011). On the other hand, it

has been mentioned before that sometimes hurdles for innovations originate on higher level and can, therefore, not be dissolved by cities themselves. This particularly accounts for market and regulatory structures that favor economy of scale and a centrally organized power system, which, unfortunately have been detected to be prevalent (see Mulgan, 2006; Seyfang and Haxeltine, 2012, Fuhrhop, 2017). Still, cities' capabilities should not be underestimated.

Eventulaly, it shall not be concealed that objectivity of results cannot always be guaranteed due to the methodological approach of this paper. First, this is due to the author having started research with pre-defined hypotheses about potential benefits. Second, case study results mainly build on primary information gained in interviews. Thereby, not only the identification of experts and case studies strongly related to the author's knowledge and contacts, but also the interviewees, themselves – particularly the case study interviews – could be regarded as biased. Still, neutrality and objectivity was tried to be achieved by complementing the qualitative information derived with extensive literature research and looking at a diverse range of case studies. It shall also be noted that detected conflicts and problems were not concealed, but addressed openly.

VI. Conclusion

In the course of this paper, several alternative power initiatives have been identified that differentiated from the conventional power system due to their peculiar combination of renewable energy technology and/or energy efficiency measures with alternative socio-economic concepts. This comprises a variety of bottom-up initiatives, such as co-housing projects, energy cooperatives, citizen grids, and many more. Still, also some top-down projects have developed in the course of re-municipalization and could, consequently, be identified.

By analyzing three different case study projects that were situated in Berlin, it could moreover be shown that – due to their cross-cutting character and orientation towards community value – the projects applied a broad variety of solutions that often tackled environmental, social and economic challenges at the same time. They can, therefore, be regarded as socio-ecological innovations. Thereby, it has to be noted that alternative power initiatives do not contribute to all dimensions of sustainable city development at the same time and in the same extent. While, projects building on the cooperative and collaborative approach – like co-housing initiatives – seem to inherit particular potential to contribute to social cohesion, municipal power utilities that rather focus on the local do-it-yourself idea, seem to particularly promote regional and, thereby, inclusive economies. Still, all of the analyzed projects exerted sustainability benefits beyond the CO2-dimension. It shall, consequently, be expected that, if they were supported more strategically, the energy transition could be used as a window of opportunity in order to contribute to the greater sustainability transformation – instead of only being looked at as a societal challenge.

In this regards, the analysis of the Berlin case showed that cities command over a broad variety of roles and instruments that can be applied to foster innovation, e.g. as regulator, financier, city planner, networker and so on. The right set of instruments, thereby, strongly depends on the project's specific needs. Still, one can say that the case of the ufaFabrik proved that provision of open space is key. Thereby, open space is not only about providing land where projects can physically realize their ideas, but also about reducing structural and cultural hurdles that prevent the innovation from establishing and thriving. Hence, it is rather about providing an atmosphere in which experimentation is possible and learning processes but also failure allowed. This further implies that a sheer focus on financial support is too narrow-minded. Successful innovation management needs a much broader set of services.

Nevertheless, the analysis of innovation management in Berlin has further revealed that the innovative potential of alternative power initiatives is still not sufficiently being acknowledged. However, the perception of the alternative power project's innovativeness marks the precondition for strategic management. The aim of this paper was to contribute to this necessary step. Now it is at the time of cities to fully tap their change agent potential.

Annex

List of Interviews

No.	Type of Expert (direct, result of snowball sampling, or desktop research)	Name (Organization) of Interviewee	Date and Location of Interview	No. of Interviewees	Other Remarks
1	Case Study (DTR)	Wiartalla, Werner (ufaFabrik)	06.03.2018, Berlin	1	Due to technical problems some minutes of the interview could not be recorded; there is hence two recordings
2	Expert (SnoSa)	Novy-Huy, Rolf (trias Stiftung)	13.03.2018, Hattingen(Ruhr)	1	
3	Expert (direct)	Walk, Prof. Heike (transformation scientist)	20.03.2018, Eberswalde	1	
4	Expert (SnoSa)	Peters, Dr. Martin (Handwerkskammer Berlin)	23.03.2018, Berlin	1	
5	Case Study (SnoSa)	Baltzer, David (Leuchtturm eG)	27.03.2018, Berlin	1	
6	Expert (direct)	Kaphengst, Timo (innovation scientist, Regionalwert AG)	27.03.2018, Potsdam	1	
7	Case Study (SnoSa)	Richter, Thomas; Efthimiou, Vassilious (Berliner Stadtwerke)	27.03.2018, Berlin	2	
8	City Contact (DTR)	Homann, Jens; Dohmen, Thomas; Kelm, Sandra (SENWEB)	28.03.2018, Berlin	3	

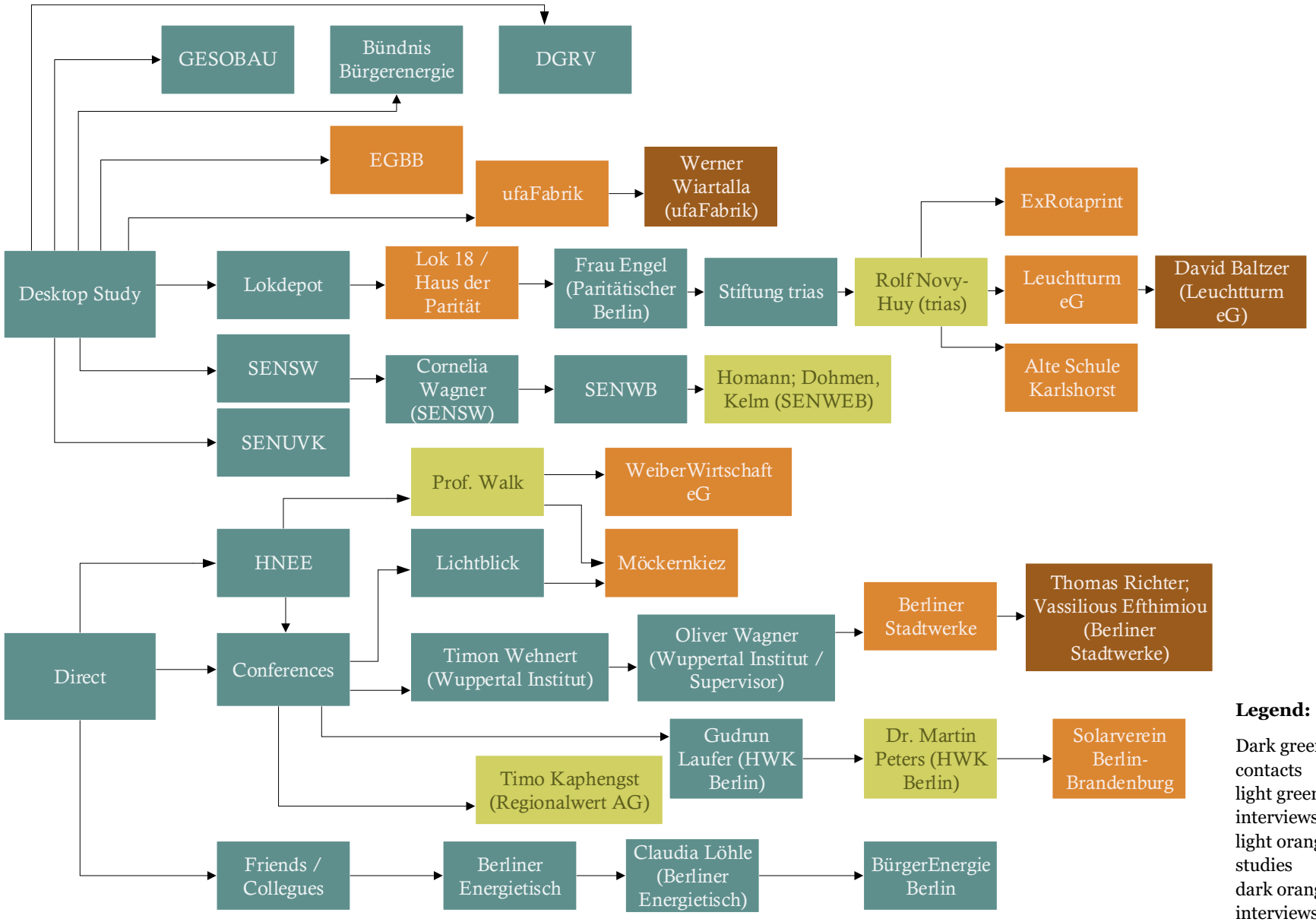
Interview Schedule: Case Study Interviews

Part I: Innovation	
What is novel?	Was ist das Konzept / die Grundidee Ihres Projektes? Was war die Motivation für die Gründung Ihres Projektes? Welche Rolle spielt das Thema Energie in Ihrem Selbstverständnis?
How novel is it?	Inwiefern unterscheidet sich Ihr Projekt von eher herkömmlichen Lösungsansätzen?
For whom does it appear to be novel?	Würden Sie Ihr Projekt als innovativ oder Innovation bezeichnen? Wie wird Ihr Projekt von Externen an- und wahrgenommen?
By whom has it been triggered?	Wie wurde das Projekt initiiert? Wie wurde und wird es finanziert?
In which phase is it?	Was würde Sie sagen, in welcher Phase befindet sich Ihr Projekt: in der Entwicklung- und Experimentierphase, in der Implementierung und Etablierung oder in der Diffusions- und Up-Scaling Phase?
Normativity gains?	Inwiefern trägt Ihr Projekt zur Erreichung der folgenden Ziele bei: Armutsreduktion, Erhöhung von Wohlbefinden, soziale Kohäsion, Geschlechtergerechtigkeit, inklusives Wachstum, Resilienz, Umweltschutz?
Part II: Innovation Management	
Readiness	Nehmen Sie die Stadt Berlin eher als Treiber oder Bremser von Wandel und Innovation wahr?
Openness	Inwiefern schafft die Stadt Berlin ein innovationsfreundliches Klima? Haben Sie im Laufe Ihres Projektes bestimmte kulturelle oder strukturelle Hürden erfahren? Wie könnte die Stadt Berlin noch bessere Freiräume schaffen?
Capacities	Haben Sie aktuell konkreten Unterstützungsbedarf?
Action	Haben Sie bisher Unterstützung irgendeiner Art von der Stadt Berlin erhalten? Wissen Sie, an wen Sie sich wenden müssen, um Unterstützung zu erhalten?

Interview Schedule: Expert Interviews

Part I: Innovation	
What is novel?	Was verstehen Sie unter Innovation und was sind eigentlich Pioniere? In meiner Masterarbeit betrachte ich vor allem gemeinschaftliche Wohnprojekte und ein rekommunalisiertes Stadtwerk. Kann man diese Projekte als innovativ bezeichnen?
How novel is it?	---
For whom does it appear to be novel?	Welche Rolle spielt Zivilgesellschaft im Bereich Innovation und welche spielt Stadt?
By whom has it been triggered?	
In which phase is it?	---
Normativity gains?	Welche Rolle spielt Innovation für nachhaltige Entwicklung? Was können Innovationen zur Erreichung der folgenden Ziele beitragen: Armutsreduktion, Wohlbefinden, soziale Kohäsion, Geschlechtergerechtigkeit, inklusives Wachstum, Resilienz, Umweltschutz?
Part II: Innovation Management	
Readiness	Nehmen Sie die Stadt Berlin eher als Treiber oder Bremser von Wandel und Innovation wahr?
Openness	Inwiefern schafft die Stadt Berlin ein innovationsfreundliches Klima und was würden Sie tendenziell eher als Hürden (kultureller oder struktureller Art) bezeichnen? Wie könnte die Stadt noch bessere Freiräume und Nischen schaffen?
Capacities	Welche Instrumente und Hebel erachten Sie als sinnvoll, um Innovationen zu fördern? Welche Ressourcen benötigen Alternativprojekte, um innovativ sein zu können?
Action	Gibt es so etwas wie städtisches Innovationsmanagement in Berlin? Wie müsste dieses idealerweise organisiert sein? Was muss die Stadt Berlin definitiv noch lernen?

Snowball-Sampling Process



Source: own illustration

List of Abbreviations

AEE	Agentur für Erneuerbare Energien / German agency for renewable energies
AG	Arbeitsgruppe / working group
AGEB	Arbeitsgruppe Energiebilanzen / working group energy statements
BBB	Berliner Bäder-Betriebe / Berlin swimming facilities
BEK	Berliner Energie- und Klimaschutzprogramm 2030 / Berlin energy and climate protection program 2030
BENE	Berliner Programm für Nachhaltige Entwicklung / Berlin program for sustainable development
BIM	Berliner Immobilienmanagement / Berlin equity management utility
BMUB	Bundesministerium für Umwelt, Bau und Reaktorsicherheit / German federal ministry for environment, construction and nuclear safety
BNetzA	Bundesnetzagentur / German national grid authority
BSR	Berliner Stadtreinigungsbetriebe / Berlin city cleaning utility
BSW	Berliner Stadtwerke / Berlin municipal power utility
BVerfG	Bundesverfassungsgericht / German federal consultation court
BVG	Berliner Verkehrsbetriebe / Berlin transport service utility
BWB	Berliner Wasserbetriebe / Berlin water service utility
DBZ	Deutsche BauZeitschrift / German construction magazine
DIW	Deutsches Institut für Wirtschaftsforschung / German institute for economic research
DSM	demand-side management
DSO	Distribution System Operator
DTR	desktop research
e.V.	eingetragener Verein / registered association
EEG	Erneuerbare-Energien-Gesetz / German renewable energy act
eG	eingetragene Genossenschaft / registered cooperative
EnWG	Energiewirtschaftsgesetz/ German energy economy act
EU	European Union
EWG Bln	Berliner Energiewendegesetz / Berlin energy transition act
GDP	Gross Domestic Product
GG	Grundgesetz / German constitution
GmbH	Gesellschaft mit beschränkter Haftung / company with limited liability
GW	gigawatt
HNEE	Hochschule für Nachhaltige Entwicklung Eberswalde / Eberswalde university for sustainable development
HWK	Handwerkskammer / German craftmen's chamber
IBB	Investitionsbank Berlin / investment bank Berlin
ICLEI	Local Governments for Sustainability
ICT	information & communication technology
innoBB	Gemeinsamen Innovationsstrategie Berlin-Brandenburg / Common innovation strategy Berlin-Brandenburg
IRENA	International Renewable Energy Agency
KfW	Kreditanstalt für Wiederaufbau / German credit institute for reconstruction
KliB	Klimaneutral Leben in Berlin / climate-neutral living in Berlin
KWh	kilowatt-hours
NGO	non-governmental organization
NUSZ	Nachbarschaftszentrum / ufaFabrik's neighborhood center
OECD	Organization for Economic Co-operation and Development
PV	photovoltaic
R&D	research & development
SDGs	Sustainable Development Goals
SENSW	Senatsverwaltung für Stadtentwicklung und Wohnen / Berlin senate administration for city development and living
SENUVK	Senatsverwaltung für Umwelt, Verkehr und Klimaschutz / Berlin senate administration for environment, traffic and climate protection
SENWEB	Senatsverwaltung für Wirtschaft, Energie und Betriebe / Berlin senate administration for economy, energy and businesses

SINTEG	Schaufenster intelligente Energie - Digitale Agenda für die Energiewende / Showcase intelligent energy – Digital agenda for the energy transition
SIWANA	Sondervermögen Infrastruktur der Wachsenden Stadt und Nachhaltigkeitsfonds / Berlin's seperate asset for infrastructure oft he growing city and sustainability fund
SNM	strategic niche management
SnoSa	result of snowball sampling process
TSO	Transmission System Operator
TWh	terawatt-hours
UBA	Umweltbundesamt / German environmental agency
UN	United Nations
VPP	virtual power plants
WBGU	Wissenschaftlicher Beirat der Bundesregierung Globale Umweltveränderungen / German scientific advisory board global environmental changes
WECF	Women in Europe for a Common Future
WindNODE	Das Schaufenster für intelligente Energie aus dem Nordosten Deutschlands / Showcase for intelligent energy from the Northeast of Germany

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