

Cooperatives governing energy infrastructure: A case study of Berlin's grid

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ABSTRACT

At present, as energy security has become one of the highest priorities discussed globally, swift social, ecological and economic changes in the energy market are taking place. In many countries, local cooperatives have been established that intend, among other goals, to purchase power grids and increase renewable energy production. This paper presents the outcomes of a research project devoted to one specific case – BürgerEnergie Berlin (BEB). This cooperative, which is bidding for a twenty-year concession to the Berlin power grid (the biggest in Germany), intends to modernise it after the purchase in order to change it into a smart grid and enable a number of local renewable sources to connect to it. A key success factors model for this cooperative – based on field studies and the use of inductive reasoning – is the original contribution to existing research on energy cooperatives. The presented qualitative analysis, taking into account the details of the process of bidding for the concession, can be an inspiration to cooperative researchers and practitioners and a contribution to a future discussion on alternative solutions to the issues of public utilities ownership and their management.

1. Introduction

Many years after Amory B. Lovins's article 'Energy Strategy: the Road not Taken?' (Lovins, 1976) was published, the turn towards renewable sources of energy has become a political priority. Lovins maintains that energy producing devices should be located close to energy end-users to avoid distribution losses and high transmission costs, to reduce the reliance on large power generating facilities and, consequently, to reduce the exposure to interest, escalation and mistimed demand forecasts (pp. 79–80). A model such as this can be put into practice by means of modern green technologies operated and managed by cooperatives. This paper concentrates on one such cooperative – BürgerEnergie Berlin (BEB) – which is competing for the concession to run the biggest grid in Germany. This purpose makes the case really unique. One of the overarching goals of this cooperative is to purchase the grid in order to invest in its future modernization, enabling the inclusion of renewable energies into the grid (hence its decentralization and change into a smart grid¹), which corresponds with Lovins's vision.

The analysis presented in this paper is related to three theoretical areas: electricity grid, energy² cooperatives and institutions (factors

that affect the attainment of the BEB goal). So far, no studies have been carried out that would combine these issues. In order to bridge this research gap, I conducted qualitative research – a method I chose after having considered the nature of the problem under investigation (a concrete case study). The paper is based on twelve semi-structured interviews conducted during the research course in 2014, which are quoted throughout the paper, as well as participant observations and examination of press releases and academic literature. I adopted this approach in an effort to preserve the inductive method of reasoning (drawing from details to formulate general findings), capturing the character of individual interpretations and complexity of the situation (see the Methods section), which served to build the model (see Fig. 1) that answers the research question: what are the internal and external factors, as well as patterns and relationships among them, considered by BEB's environment as essential for the purchase of Berlin's power grid?

The latest power grid literature focuses primarily on topics such as utilities regulation (e.g. Spiller & Tommasi, 2008, pp. 515–543), attempts to purchase grids by municipalities (Schorsch & Faber, 2010; Theobald & Pál, 2013), or problems related to the management of utilities by large corporations that are reluctant to invest in expensive

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¹ The European Commission defines smart grids as follows: 'Smart Grids could be described as an upgraded electricity network to which two-way digital communication between supplier and consumer, intelligent metering and monitoring systems have been added. Intelligent metering is usually an inherent part of Smart Grids' (EC, 2011, p. 2).

² Throughout this paper the term 'energy' is used to mean 'electricity', following a trend in the literature, despite the fact that its meaning is broader and includes transportation and heating/cooling services.

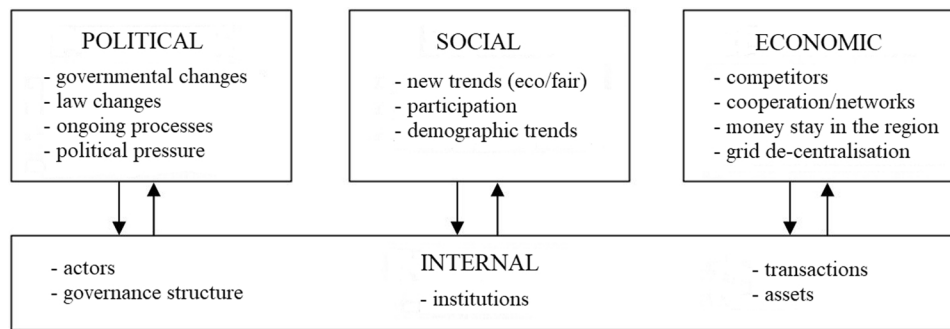


Fig. 1. Key success factors for the BürgerEnergie Berlin purchase of the Berlin grid.

grids adaptations to be able to integrate small local generators (e.g. Sovacool, 2008). Not much attention is devoted to applying for concessions by electricity cooperatives, although the example of a small cooperative from Schönau managing the local power grid is frequently referred to (Cappelletti, Vallar, & Wyssling, 2016; Yildiz et al., 2019, p. 284). Electricity cooperatives are described in detail in the literature on the subject (e.g. Yildiz et al., 2015; Müller et al., 2015; Holstenkamp & Kahla, 2016; Holstenkamp et al., 2017; Rommel, Radtke, von Jorck, Mey, & Yildiz, 2018) but it should be emphasised that they are quite dissimilar – the ones generating energy have little in common with large retail cooperatives like Greenpeace Energy, and small heat grids governed by local cooperatives (the most popular in Germany) bear little resemblance to Berlin's grid (see the description of electricity cooperatives in Germany in the next section). Taking that fact into consideration, the analysed example has a chance to become an inspiration for scientists as well as practitioners studying and promoting the takeover of utilities by cooperatives. To identify the factors that affect the achievement of the BEB goal, that is the purchase of the grid, in this article I use the new institutional economics (NIE) models, in particular theories of Mancur Olson (1971), Sue E. S. Crawford and Elinor Ostrom (1995), Elinor Ostrom (2005; 2009), Arild Vatn (2005) and Konrad Hagedorn (2008). Before this BEB initiative is described and examined in sections five and six of this paper, I explain the situation of the energy market in Germany and electricity cooperatives in Section 2, and outline the history of the Berlin grid as well as the ongoing bidding process in Section 3. Research methods are presented in Section 4. The analysis of BEB is followed by a discussion and conclusions.

2. German energy market and electricity cooperatives

Since 1998, the energy industry in Germany has been subject to a restructuring process, including the liberalisation and privatisation of monopolistic energy suppliers which were divided into smaller units responsible, according to the value chain, for electricity production, transmission and sale (Brandt, 2006, p. 2). New public policies were introduced, designed to separate energy producers from network operators – a tactic aimed at creating a competitive market with grids available to smaller energy providers (Lambing, 2012). Despite these efforts, the concessions to operate almost one thousand individual grids have been granted to four major companies: TenneT, Amprion (RWE), EnBW Transportnetz and 50Hertz (Vattenfall), all of which also own electricity utilities (the largest four being E.ON, RWE, EnBW and Vattenfall) (OECD, 2012, p. 101). This privatisation process can be, therefore, considered a state failure because it did not achieve the intended result of creating a competitive market.

At the same time, the term *Energiewende* gained in popularity. It was coined in the 1980s, denoting 'growth and prosperity without petroleum and uranium' (Strunz, 2014, p. 150). This notion, however, remained on the periphery of political discourse for thirty years – consecutive governments largely disregarded it, much to the advantage

of big energy companies and favouring low electricity generation costs. This logic is consistent with the assumptions of natural monopoly, defined by Kenneth E. Train as a situation when 'a condition required for competition (that is, numerous firms) conflicts with the attainment of the benefits of competition (namely, production at lowest possible cost, which requires one firm)' (Train, 1991, p.1). The properties of a natural monopoly, the power grid in this case, such as specific large sunk investments, economy of scale and scope, and massive consumption of energy (Spiller and Tommasi, 2008, p. 518) lead to market failure (inefficient distribution of energy by free market) and require regulation to ensure socially desirable outcomes. Unless compelled by regulation, these large power generation and distribution corporations have no interest in making expensive investments in renewable technologies or in reducing electricity consumption. Instead of costly wind, solar or biomass energy, they tend to purchase and distribute energy obtained from coal and gas (50 per cent of the total German energy supply in 2017) and nuclear power plants (12 per cent of supply (AG Energiebilanzen, 2017)). This fact can also be perceived as a policy failure.

Fortunately, the supply chain management, including energy facilities and infrastructure governance, has recently drawn much attention of societies, governments and the private sector. I perceive this as a response to three main issues related to the energy market:

- the problem of public goods that have been privatised, which often leads to policy failures (primary focus on market monopolisation and on gaining short-term profits instead of investing in utilities to improve system performance),
- environmental problems, including climate change (carbon dioxide emissions), as well as safety concerns relating to the operation of nuclear and coal power plants and their waste management,
- the control problem in increasing civil engagement in monitoring and governance of public services, including the aspirations to establish participatory governance of the infrastructure.

Electricity cooperative(s), having 'dual nature', 'forming both a social group and a business enterprise' (Bonus, 1986, pp. 310–311) due to their *Genossenschaftsgeist* (cooperative spirit), by offering not only rational arguments but also appealing to feelings (Draheim, 1952, pp. 43–44), can actively address these issues. As explained by Holger Bonus, citing Georg Draheim's monograph (Draheim, 1952): 'the cooperative spirit was to be considered a strength capable of affecting important business factors such as the kind, size, development, stability, and competitiveness of the cooperative enterprise' (Bonus, 1986, p. 311). In this approach 'noneconomic motives' play a vital role that is related to the purpose of electricity cooperatives' activities. On the one hand, they express deep concern for the environment and community; on the other, they represent civil society, often emerging from grassroots ecological movements.

A large number of new electricity cooperatives have emerged in Germany recently – 832 have been established in the last fifteen years,

coming up to a total of 907 in 2014 (Yildiz et al., 2015, p. 62). While political and economic incentives were a powerful factor in this development, other aspects were equally effective. Among those were low barriers to entry (the cost of a share is usually between EUR 50 and 5000, so a large portion of the population can partake if interested in membership), playing an active role in decision-making processes due to the democratic mode of cooperative governance, as well as the institutional support of Deutscher Genossenschafts- und Raiffeisenverband (German Cooperative and Raiffeisen Confederation, DGRV) (DGRV, 2015) – involved in cooperative auditing and consulting that lowers investment risk. Some of these electricity cooperatives achieved such success that a number of new co-ops emerged in the region, which resulted in cooperative clustering and encouraged the establishment of umbrella organisations.

Today, energy cooperatives cover the entire energy value chain and are usually classified as: power generation or production cooperatives (the highest number in Germany $n = 635$) that own and/or manage and/or hold shares in companies that own the facilities for electricity and heat production; transmission or distribution cooperatives ($n = 198$) that operate small local grids; and energy trading or selling cooperatives ($n = 40$) whose core operations consist of buying and selling energy or energy resources (Yildiz et al., 2015, p. 62). The research case analysed in this article, BürgerEnergie Berlin, focuses on obtaining the concession to purchase and manage the biggest grid in Germany, which is an unprecedented case on that scale.

3. Berlin grid and Bürgerenergie Berlin

As early as 1884, a pioneer public energy company Städtische Elektrizitäts-Werke was established in Berlin. It was the first public power plant and network operator in Germany. It was taken over by the newly established private company Berliner Städtische Elektrizitätswerke Akt.-Ges (BEWAG) in the 1920s, which leased the facilities from the city of Berlin – the city retained ownership of the utilities. The company grew and changed with the city, was divided during the Berlin partition and merged back in 1990. Despite ownership changes, the Berlin State remained a majority shareholder (50.8 per cent) in BEWAG until 1997. The company was sold to Veba and Viag (other shareholders) that later merged to form E.ON and sold its shares to the Hamburgische Elektrizitäts-Werke AG (HEW), a subsidiary of the Swedish power company Vattenfall in 2001 (Antikepapiere, 2015).

I think it was 12 years ago when Vattenfall bought the majority of shares of BEWAG. [...] Berlin had a massive problem with money, many debts. Thus, the government tried to sell the state owned – so Berlin owned – companies like GASAG – the gas company, the water company and the energy company. [...] Politicians said that it was a good move not to sell the company to an investment group or any other anonymous company, but a Swedish state-owned company. [...] However, after the accidents in Krümmel – the German nuclear plant – the trust in Vattenfall shrank rapidly. (Vattenfall representative, Interview)

The gas and energy distribution networks in Germany are subject to concession contracts, therefore Vattenfall or any other grid owner cannot use public roads or infrastructure to operate it without holding the concession (Theobald & Pál, 2013). Since most of the power grid concessions in Germany have just expired or will expire soon (Ecoprog, 2015) their re-granting process aroused much debate in the recent years about their governance structure. The Berlin grid, one of the biggest in Europe, with 35,000 km of underground cable and more than 8,000 substations, supplies more than 2.1 million households and 100,000 companies (Vattenfall representative, Interview). The concession to operate it has expired in 2014, and the process of its re-granting, troubled by many difficulties and setbacks, is still in progress.³ Until the case is settled, Vattenfall remains the owner and the operator of the grid.

One of the entities applying for the concession to the grid is the organisation described in my research case, BürgerEnergie Berlin. It was established in December 2011 and registered as a cooperative society with legal rights to conduct commercial operations. Its intended goal was purchasing property rights to the Berlin power grid in order to provide electricity at reasonable prices to the citizens of Berlin, as well as investing future profits in the integration of renewable energies into the grid, therefore making it decentralised and changing it into a smart grid. Arwen Colell (a member of the BEB board of directors) recalls BEB beginnings:

[w]e have been friends with Luise [Neumann-Cosel, second member of the BEB board of directors at the time of the interview] for years and we were both involved in renewable energies. [...] We started to discuss the Rekommunalisierung [re-municipalisation] idea and it just came up. We thought – it is something we should do – buy the grid. [...] we established the cooperative and found people for the supervisory board and 15 founding members. Then it grew. (Colell, Interview)

At present, as the concession of the current operator Vattenfall expired, some options became available. BEB allows for two models of ownership, with only one partner allowed to run the grid in cooperation with Berlin Energie (BE) – a recently established state-owned company. The one model described on the BEB website specifies that 51 per cent of shares is to be held by BE and 49 per cent by BEB (BEB, 2017; Berliner Energietisch, 2015). The other model assumes a 75/25 per cent division of shares between the partners (Hinnecke, Interview 1; Walter, Interview).

When the concession granting process began at the end of 2011, eight organisations were interested in buying the grid, including the large corporations (Focus, 2012). Only three of the participating organisations remained involved until the current stage: Berlin Energie alone, which is bidding for the whole network (which would mean re-municipalisation of the grid), a Vattenfall subsidiary Stromnetz Berlin, also bidding for 100 per cent of the grid (if it succeeds the situation will remain unchanged) and the joint venture of BE and BEB described above. Regardless of the bids by the interested parties, the Minister of Finance and the Mayor of Berlin have the last word, in accordance with the recommendations of Bundesnetzagentur (the Federal Network Agency) and the Bundeskartellamt (the Federal Cartel Agency). The conditions and the process of this infrastructure and management rights transfer could be an interesting study to be replicated or followed by other electricity cooperatives. However, this article focuses on the success factors of BEB as a network organisation (Spiller & Tommasi, 2008) rather than property rights transfer per se (Bromley, 1991; Demsetz, 1967).

4. Methods

This article is based on rich empirical data related to the BürgerEnergie Berlin case study, used as the basis for inductive theory development (Eisenhardt & Graebner, 2007; Mintzberg & Waters, 1982; Siggelkow, 2007; Weick, 2007). It is claimed that ‘papers that built theory from cases are often regarded as the ‘most interesting’ research (Bartunek, Rynes, & Ireland, 2006) and are among the most highly cited pieces’ (Eisenhardt & Graebner, 2007). The inductive approach was chosen for this study to create theoretical constructs, emerging from data collected during research, whose main goal was to find an answer to the research question:

³ The research on which this article is based was conducted in the second half of 2014. The author has been waiting for more than three years for the concession grant in order to publish this article. Thus far nothing suggests that the concession will be granted in the upcoming year or two.

- what are the internal and external factors, as well as patterns and relationships among them, considered by BEB's environment as essential for the purchase of Berlin's power grid?

Replication logic is central to the inductive research strategy (Eisenhardt, 1989), thus the analysis of BEB as the subject of the case study and the categorisation of success factors presented in the following sections of this article can be used by other researchers in their empirical inquiries.

To evaluate the performance of BürgerEnergie Berlin, and to analyse the previously mentioned factors of the grid rights transfer, three main sources have been used.

First, an extensive literature review to capture the ideas and theorisations of electricity cooperatives (among others Röpke, 1992; Mönkner, 2001; Bijman, Hendrikse, & Oijen, 2012; Bijman, Iliopoulos, et al., 2012; Lambing, 2012; Mori, 2013; Yildiz, 2014; Yildiz et al., 2015; Müller et al., 2015; Holstenkamp & Kahla, 2016; Holstenkamp et al., 2017; Rommel et al., 2018) and power grids (among others Train, 1991; Hansmann, 1996; Spiller & Tommasi, 2008; Fox-Penner, 2010; Schorsch & Faber, 2010; Theobald & Pál, 2013; Strunz, 2014), including their history and current significance. These theories resurface in all sections of this paper, which helps to conceptualise the empirical observations made in Berlin.

Second, twelve semi-structured interviews with:

- both representatives of the BEB board of directors, two representatives of the BEB supervisory board (one of them also represented GLS (Gemeinschaftsbank für Leihen und Schenken) Treuhand in the interview), five members of the BEB Team (two interviews were conducted with the same person – Matthias Hinnecke – one in September, the other in November 2014),
- and, in order not to be biased in BEB's favour, two representatives from BEB's external environment: one of them a direct competitor, Vattenfall, and the other – Senatsverwaltung für Stadtentwicklung und Umwelt (Senate Department for Urban Development and the Environment). Both persons wanted to remain anonymous, which can be perceived as a limitation to this study.

Apart from the nine interviews that were conducted in English, three were conducted in German, therefore some of the quotes in this article are translated. All interviews were conducted between August and December 2014.

Finally, this paper draws on direct observations (Reinharz, 1992, pp. 46–75; Creswell, 2009, pp. 173–202; Babbie, 2011, pp. 313–353) of BEB events such as: a film screening of 'Das Schönauer Gefühl' (The Schönauer feeling) followed by a discussion, NetzGipfel (network summit) and NetzLabor (network laboratory), information stands (in September 2014 at the Brandenburger Tor and in November the same year at Heldenmarkt) and one official meeting (general assembly).

After a thorough examination of the collected press releases, academic articles, observations and interviews, a list of factors was prepared (the inductive approach discussed above) and organised according to the systematisation proposed in the literature (Aguilar, 1967; Freeman & Louçã, 2001; Inglehart, 1997). The collected information was verified by the simultaneous use of different sources (triangulation) to assure the credibility of the conducted inquiry study (Denzin, 2006; Flick, 2011). For this purpose ATLAS.ti (the Qualitative Data Analysis & Research Software) was used. The outcomes, described in the following paragraphs, are also corroborated by literature (e.g. Hirschman, 1970; Olson, 1971; Crawford & Ostrom, 1995; Vatn, 2005; Spiller & Tommasi, 2008) and, most importantly, can serve as an inspiration to other electricity cooperatives.

The choice of the above methods, especially qualitative research ones, was dictated by an attempt to answer the research question on the specific case study of applying for a concession for running Berlin's power grid by BEB cooperative. Exploration of the above process

assumed the use of diverse research practices including gathering participants' opinions, allowing for values, examining the context and situation of participants, cooperating with them and interpreting the collected data (Creswell, 2009, p.17). These practices were used to build a coherent theoretical construct and collect factors that influence the process of applying for a power grid concession, which are presented in Fig. 1 and discussed in the section below. I believe that this is what makes this original paper useful for both cooperative researchers and practitioners.

5. Research environment

The issue of the grid and its ownership garnered a lot of attention in Berlin in 2011, when the Berlin alliance – the Berliner Energietisch (BET) – started a re-municipalisation campaign (Berliner Energietisch, 2015). A referendum on energy policies of the city and the establishment of a Berlin-owned municipal utility network was held on November 3rd, 2013. Although it failed, falling 21,000 votes short, it still had a turnout of 600,000 citizens, with 83 per cent supporting re-municipalisation, indicating that 'they want change in the energy structure' (Hinnecke, Interview 1). BürgerEnergie Berlin had supported the BET campaign, collected signatures and organised complementary events. However, a new strategy was adopted after the referendum. Arwen Colell declared: 'we are not campaigning for a pure communal management. We don't want to be recognised as a company against Vattenfall. We want to be an alternative for Berlin' (Colell, Interview). Since then, BürgerEnergie Berlin has focused on its own activities and events. It follows a traditional model, therefore only members of the organisation can become members of the board of directors and the supervisory board (Bijman, Hendrikse, et al., 2012; Bijman, Iliopoulos, et al., 2012)⁴. At the time the fieldwork was performed, two women – Luise Neumann-Cosel and Arwen Colell – held executive power over the organisation, who have now been replaced by a woman and a man (BEB, 2019). The length of term for members of the board of directors is two years and they are nominated by the supervisory board, not elected directly by members at the general assembly. Currently, six members hold seats on the supervisory board, two women (both Arwen Colell and Luise Neumann-Cosel) and four men (BEB, 2019), since according to the Statute the number of the board members must be divisible by three (Satzung der BürgerEnergie Berlin eG, §8 (2)). The term of office for members of the supervisory board is three years, and one third of their number is elected by the general assembly each year. Both the board of directors and the supervisory board members can be re-elected.

At the end of 2014, when the research was conducted, BEB had around 800 regular members and more than 1800 people who have transferred money to the GLS Treuhand escrow accounts, i.e. the so called Treugeber. If the cooperative is granted the concession, the Treugeber will automatically become members of BEB and their money will turn into cooperative shares. Otherwise, the money will be returned. Although the total number of members and Treugeber exceeds 2,500, only 100–120 attend general assemblies, as confirmed by Peter Schmidt and Luise Neumann-Cosel in the interviews and the observation of the general assembly on December 8th, 2014. Peter Schmidt describes an average member as follows:

[She/He] is a green-minded person. We have representatives of all generations, so we are not only supported by people sixty-plus. [...] The second feature of a member is a belief in democracy. [...] We also feel that it interests people from other countries; maybe they can set up something similar in their own country. (Schmidt, Interview)

⁴ Different organisational models of energy cooperatives are also discussed in more detail by Mathias Georg Dilger, Konter, and Voigt, (2017).

Peter Schmidt is one of BEB's campaigners who organise an information stand or a presentation once a month. Additionally, every three months the group prepares campaigner seminars for members and non-members who wish to become more involved in BEB activities. This group numbers 30–40 people (according to Martina Jantsch, Interview), but the core staff of any specific event is 4–5 people, joined by another 2–3 (Schmidt, Interview). All active members are referred to as the 'Team' at BEB's website, where twelve people are introduced (BEB, 2019). Another campaigner, Kirsten Heining, remarks that the division of work takes place as early as at the seminars: 'all people introduce themselves, what they do, what is their background and then BEB work is presented. Next it is all about who can do what. Who can attend the information stand, who can sit in the office, who can make calls, etc.' (Heining, Interview). She portrays members of the team along these lines:

I would say ca. 70 per cent of the team are men, between late-20 s to mid-40 s. They are typical political activists, especially men. They like to talk a lot and to be everywhere. I think there are too few women, that's why I would like to be even more involved. It is like this in the energy sector. (Heining, Interview)

It can be concluded from the interviews that gender is an important factor at the BEB. Both founders are women, which is unusual in the energy sector and, as both women and men are campaigners at BEB information stands, the mix of both genders among members projects a positive image of the cooperative.

All of the above statements are consistent with Hans H. Münkner's theory, according to which in order for a cooperative to grow, the following minimum requirements have to be met: face-to-face communication, heterogeneity of members, freedom to enter and exit, long-term goals, collective memory and democratic rule (Münkner, 2001, pp. 16–22). The idea of multi-stakeholder cooperatives promoted by Münkner is discussed by Henry Hansmann (1996) who defines homogeneous interest as a necessary precondition for a successful cooperative organisation. BEB is a multi-stakeholder cooperative as some of its members are companies and environmental organisations, and as such they need to appoint individual people as representatives with member powers. This solution avoids the conflict of interest that Hansmann cites as the (probable) main reason for the non-existence of urban utility cooperatives in the United States in the 1990s (Hansmann, 1996, pp. 173–181). In analysing the energy market, Hansmann maintains that 'under any type of voting scheme there might well be substantial struggle among residential, commercial, and industrial customers for control of the utility' (Hansmann, 1996, p. 175). Such developments may in fact take place in the future when BEB will have influence over grid management. Until now, however, according to my observations, conflicts of particular interests have been avoided. Today, there is only one criterion for BEB membership: 'we are not going to work with any company that either owns or operates a nuclear power plant or has shares of such a company' (Neumann-Cosel, Interview). The interest of private companies in the purchase of shares in the cooperative – since not only residents can be BEB shareholders – counters another argument quoted by Hansmann related to high capital intensity of utilities (Hansmann, 1996, p. 170). At the same time, it is worth mentioning that although Berlin is perceived as a poor city (which, of course, depends on the frame of reference), 1.8 million inhabitants are economically active (Amt für Statistik Berlin-Brandenburg, 2015). If every one of these residents bought one share for EUR 500, BEB could purchase the grid even without taking out a bank loan (see discussion on grid price in the section below). Finally, although the city is very heterogeneous, with many tenants and few owners, tenants can choose their electricity supplier (Deutsches Mietrecht, 2018), which disproves Hansmann's last reservation regarding grid management by a cooperative in the city, i.e. that tenants care little about the city's infrastructure (Hansmann, 1996, pp. 174–175).

6. The Bürgerenergie Berlin key success factors

Economists Chris Freeman and Francisco Louçã, known for their research in innovation studies, introduce a 'new research agenda', focused on the one hand on natural processes in economies and societies, but also on 'conscious choice and purposeful action' on the other (Freeman & Louçã, 2001, p. 120). They encourage researchers to observe and describe an 'action arena' (after Elinor Ostrom, 2005, p. 13), but also acknowledge the agency of 'participants'. Furthermore, the authors list sets of variables distinctive for social coordination: 'the technological, scientific, economic, political, institutional and cultural subsystems' as well as 'the semi-autonomous variables connecting those subsystems' (Freeman & Louçã, 2001, p. 120). On the basis of their research agenda premises, but also in conjunction with other researchers' works (e.g. Francis J. Aguilar, 1967; Ronald Inglehart, 1997), I identified BEB success factors and grouped them into four categories: Political, Social, Economic (all three can be characterised as sets external to BEB) and Internal, related to the heart of BEB as an organisation (see Fig. 1).

Conditions and mechanisms central to creating, developing and maintaining an effective and efficient electricity cooperative depend on reciprocal relations between the cooperative and its environment, illustrated as two-way arrows in Fig. 1, as well as on its focus on internal qualities. On the one hand, the cooperative functions in the public space and builds its political capital on its visibility, thus it requires a coherent internal environment and a consistent strategy. In turn, BEB's external environment has pervasive influence on its stability and growth. Arwen Colell summarises these relationships as follows: 'we need to have political weight – and our chance, because we are very small, is to be very loud and to be visible a lot' (Interview). Her comment points to all the sets presented in Fig. 1, showing that they are interconnected and they affect each other.

The most important political factor that influenced the bidding process was the resignation of Berlin's mayor Klaus Wowereit together with his finance senator Ulrich Nussbaum⁵, followed by the appointment of Michael Müller⁶ for the new mayor and Matthias Kollatz-Ahnen for the new finance senator by Sozialdemokratische Partei Deutschlands (Social Democratic Party of Germany, SPD) members (DW, 2014). Because of this change, the issues that had taken place within the bidding process and problems related to the gas grid concession, some steps of the power grid concession process were repeated. The gas grid concession granting process started a year before the energy concession process and has followed a very similar trajectory. The gas grid was previously governed by a large private conglomerate Berliner Gaswerke AG (GASAG), but its concession expired in 2013. In March 2014 two bidders remained: GASAG and Berlin Energie – the same newly established public company that is bidding for the power grid. When Berlin Energie won the concession, GASAG lodged a complaint with the court, claiming that their competitor was incapable of managing the grid due to having an underdeveloped structure. Because of that complaint some steps of the process needed to be repeated in order for BE to alter its structure and receive the concession. The power grid concession process was automatically halted as well and, similarly, some steps had to be repeated (represented by 'ongoing processes' in Fig. 1). At the moment, the case is in the district court because Vattenfall has lodged a complaint about supposed errors in the earlier stages of the granting process (Frese, 2017).

⁵ Their resignation was not directly related to the issue of the power grid, but to the inability to finish the construction of the Berlin Brandenburg airport (initially scheduled to be opened in 2010). The mayor was accused of mismanagement and corruption (Oltermann, 2014; Hinnecke, Interview 1; Walter, Interview).

⁶ He used to be the environment senator, thus BEB sees him as more suitable for the office.

The respondents reiterate that ‘after all, it is a political decision’ (Vattenfall representative; Walter, Interview). The Vattenfall representative adds: ‘the left party and the green and the social democratic party – they were sure that they want to buy the grid before the [re-municipalisation] referendum’ (Interview). Although these parties constitute a coalition currently wielding power in Berlin, the contracting authority, which originates with the Senate Department of Finance, must abide by the law and ensure a non-discriminatory procedure. Because Vattenfall has lodged a complaint to the court, the case may be stuck there for years, similarly to the gas grid concession, but at the same time the Finance Senator can try to secure a better bargaining position with regard to the cooperation model (e.g. between Vattenfall and Berlin Energie or BürgerEnergie Berlin and Berlin Energie).

What makes BEB a front-runner is the fact that coalition parties support the Energiewende and exert political pressure (see Fig. 1) on German business entities to comply. In Berlin, one of the goals is the 80 per cent reduction of carbon dioxide emissions by 2050 (Senate representative, Interview). If the quantity of renewable energy continues to grow this fast, the grid will need to be modernised and changed into a smart grid. Since Vattenfall is not interested in expensive investments in the grid (it has its own gas and coal power plants connected to it), which can be perceived as another policy failure, BEB’s particular sensitivity to this issue puts the cooperative in a very good light and attracts many supporters to its cause – including politicians.

The last aspect listed in the Political set (Fig. 1) that needs to be mentioned here is changing laws that pertain to investments in co-operative assets. DGRV reported in 2014 that energy cooperatives on average pay a 4.26 per cent dividend, which is considerable in comparison to interest rates offered by banks, which are close to zero (Oberhuber, 2014). To protect investors, in July 2014 changes were introduced to Kapitalanlagegesetzbuch (the German Investment Code, KAGB). According to these, companies that exceed the investment threshold of 100 million euros in e.g. grid operation or other holdings (though not in power and heat generation) must register as investment funds, be certified and their boards are required to have experience in fund management (Oberhuber, 2014; Walter, Interview; Hinnecke, Interview II). This was the reason behind a sharp fall in establishing new energy cooperatives in 2014 and 2015 and an investment backlog of 290 million euros in the energy cooperative sector according to DGRV (DGRV, 2016). This uncertainty was also shared by BEB and called its future investments into question. Fortunately, DGRV successfully negotiated with Bundesanstalt für Finanzdienstleistungsaufsicht (the Federal Financial Supervisory Authority, BaFin) on exempting the cooperative from that regulation.

The considerable amount of interest in initiatives such as BEB results from social factors (see Fig. 1) which are very much to BEB’s advantage. Germans do identify themselves with Energiewende and regard it as a grass-roots initiative. It is trendy to be eco-friendly, even if it’s costly. As early as 2012, more than 10 per cent of all German households have intentionally chosen more expensive electricity tariffs based entirely on renewable energies (Mattes & Wittenberg, 2012, p. 10). Ecological trends in German society are followed by an eagerness to increase the awareness of citizens about their immediate environment and arouse their interest in self-governance. This interest in decision-making was evident during the successful referendum on Berlin water utilities re-municipalisation in 2011, and more recently during a referendum against urban development at the closed Airport Tempelhof (also known as Tempelhofer Feld) in 2014 (Die Welt, 2011; Berliner Zeitung, 2014). These phenomena can stem from disappointment in and distrust of large corporations, a sentiment which surfaced several times in the interviews. Peter Schmidt puts it this way:

the cooperative model is gaining more and more importance and interest. People realise that only privatisation and selling basic infrastructure to international corporations, which are only interested in making profits, [...] is not a right strategy for essential

infrastructure like electricity, water. [...] You should open the floor to direct participation and in this case a cooperative is a good model. (Schmidt, Interview)

This direct control over the grid might not be as easy as imagined. Mancur Olson’s (1971) theory of interest groups warns us that organisational growth puts pressure on their principles (p. 2). In 2014, BEB already had almost 800 members and, if successful, this number will grow to almost 3,000. Obviously, as BEB collects funds from its members, this concern with self-governance boosting BEB membership gives BEB higher chances to succeed with the grid purchase – every citizen (and the number of Berlin’s inhabitants is growing) can buy a minimum of EUR 500 worth of BEB shares⁷ and have a vote at the general assembly. Regardless of the number of shares purchased, every person holds one vote to ensure bigger investors do not dominate smaller ones.

By December 2014, BEB collected 10.8 million euros, which can be considered a success. However, it is not clear how much the power grid will cost. That brings us closer to the Economic set presented in Fig. 1. The city Senate assessed the grid’s value at 400 million euros while Vattenfall claims it is worth around three billion. One of my interviewees explains the ways of estimating the grid’s value:

[w]e have several hints, we can’t call it data. One is: if you can see what you can earn, the return of money when you’re in control of the grid for twenty years, in this concession period. There is one number – it’s between 800 million and 1.2 billion euros. The other point is the question: if you built the whole grid next to Berlin, in the Brandenburg lane, how much would it cost? If you had to buy it all, every cable, every grid station, then you have the number 2.5–3.3 billion euros. You have these two numbers. Between these two numbers you will have the price. It is a negotiation. (Vattenfall representative, Interview)

Steffen Walter corroborates this and remarks that the price will be set most probably near 1 billion euros. He also acknowledges that the BEB joint venture with BE gives BEB a chance to take out a loan on better terms than offered by a commercial bank (Interview). Matthias Futterlieb explains:

when you are buying this kind of infrastructure, you are not doing it with your own capital. Usually it is 40 per cent as equity share. [...] If we assume that our 11 million euros is 40 per cent plus we get 60 per cent externally funded, then we could at the current stage buy 3 per cent of the grid. (Futterlieb, Interview)

Quite surprisingly, the respondents shared the overall belief that the money is not important. Matthias Hinnecke claims ‘money is not the point, because a bank like GLS can collect 50 million euros whenever they want, if there is political possibility to get the grid, they will collect’ (Interview I). Arwen Colell comments further: ‘if there is a cooperative that has a chance to take over the grid of a capital city, everyone would rally’ (Colell, Interview). Finally, even the Vattenfall representative declares: ‘so you can see it in history, in every nation. If it is important enough, money doesn’t play a role’ (Vattenfall representative, Interview).

This position of Vattenfall may seem unusual, but there is a reason for it – as the Vattenfall representative divulges: ‘[t]his is a difficulty with Vattenfall. The signals from Sweden change from governmental term to governmental term. Now [...] maybe they decide to leave the country [Germany]’ (Vattenfall representative, Interview). It seems

⁷ It is established in the BEB membership agreement that the lowest share is to be 100 euros, thus a minimum of 5 shares gives one person the right to vote at the general assembly. This gives the general public a number of options, e.g. five students or low income people can purchase five shares and decide among themselves on one person (or perhaps adopt the rotation principle) who will represent them at the meetings. Unfortunately, from the Transaction Costs Economics perspective (Williamson, 1993) such a move does not pay off.

clear that the situation of BEB's direct competitor is uncertain. BEB also keeps winning other battles – it managed to establish cooperation with various organisations and now is a part of several cooperative networks. Strategic cooperation with GLS Bank, especially GLS Treuhand e.V. that manages the Treugeber accounts, might be important when the concession is granted, and BEB were to look for a good loan offer. Other networks BEB is a member of, such as Netzwerk Energiewende Jetzt or Bundesverband Erneubare Energie e.V., are focused on political lobbying and representing the electricity cooperative sector. Finally, close cooperation with other electricity cooperatives from Schönau, Oldenburg or Hamburg, as well as Berlin organisations such as the previously mentioned Berliner Energietisch or car-sharing cooperatives, give BEB more credibility, increase its visibility and might be helpful in solving its problems in the future. The last two factors listed in this category are: the argument that money remains in the region if invested in a local cooperative and the claim that BEB profits will be re-invested in grid decentralisation. Both aspects definitely work to the benefit of the cooperative. Yet, BEB needs to care not only about its external environment, but also its internal features.

Some of the factors listed in the last set, the Internal factors (Fig.1), which is based on the Elinor Ostrom (2009) 'Sustainability of Social-Ecological Systems' and Konrad Hagedorn (2008) 'Institutions of Sustainability' models, have already been described in detail earlier in this paper. However, three additional comments need to be made. First, one of the biggest assets to BEB is an experienced lawyer – Hartmut Gaßner – on the supervisory board. Without him and his office (Gaßner, Groth, Siederer & Coll.) some problems with the official bidding procedure (e.g. responding to the Berlin Senate's catalogue of questions) would not have been solved as well or as quickly as they were (Beckmann & Neumann-Cosel, Interviews). Second, the cooperative governance structure, although very attractive to citizens, does not fit the models already present in the market. As Lukas Beckmann emphasises in the interview, BEB belongs to the *Eingetragene Genossenschaft* (registered cooperative society, eG) category which 'is a different form' than *Gesellschaft mit beschränkter Haftung* (limited liability company, GmbH) to which category belong the other two entities: Berlin Energie and Stromnetz Berlin (Vattenfall subsidiary). These two different governance structures have dissimilar ways of decision-making and distribution of responsibilities, therefore eG might need more time to reach an agreement on certain issues than GmbH; on the other hand, eG may be more resistant to economic and political pressures. The third comment concerns institutions, defined as 'enduring regularities of human action in situations structured by rules, norms and shared strategies, as well as by the physical world' (Crawford & Ostrom, 1995, p. 582). These institutions might help in case of conflicting interests and limit the opportunistic behaviour of actors involved (Spiller & Tommasi, 2008). Some institutions are outlined in the BEB Statute (Satzung der BürgerEnergie Berlin eG). One of them is the simple majority rule in the general assembly. The simple majority rule is, according to Bruno S. Frey, the best known and the most important direct democratic decision-making mechanism, with all its advantages (easy to understand, cheap to organise and in accordance with one-person, one-vote principle) and shortcomings (e.g. it can be subject to manipulation, it is not always 'just', or preference intensities cannot be revealed – voters can only vote in favour, against or abstain) (Frey, 1983, 88–90). Another BEB institution is the no-veto, or no immediate 'exit' power (Hirschman, 1970), which means in practice that withdrawing money from the cooperative takes three years at a minimum (Satzung der BürgerEnergie Berlin eG, §9). Albert O. Hirschman in his book 'Exit, Voice, and Loyalty' (Hirschman, 1970) discusses, among others, two options available to members of the organisation – 'exit' or 'voice' – in case they noticed a decrease in the quality of its operation or lack of profitability of their further involvement. The use of voice means an attempt to influence or directly make changes in order to improve the organisation, which entails certain costs (direct expenses and, for example, time and actions taken), while the second option – exit – is

generally costless, except when loyalty is present. In the case of BEB, the organisation's statute prevents a cost-free exit, thus encouraging engagement and use of voice rather than exit. Another BEB internal institution is the way of making other decisions which, whether it lies within the purview of the supervisory board, the board of directors or the team, are made by consensus (Neumann-Cosel & Schmidt, Interviews). Finally, there is no official code of conduct, however new members are expected to learn how to represent BEB at the 'campaigner seminars' described earlier (Heininger, Interview). BEB actions are not evaluated in any systematic way either, and although Arwen Colell insists that the team knows best where to set up the information stand and what action will be effective (Colell, Interview), it might be reasonable to codify this knowledge in the future. Since the decision on the concession has not been reached yet, there is still some time for all the parties to act upon these Social, Political, Economic and Internal fields.

7. Discussion and directions for further research

The analysis that allowed to answer the given research question led to the creation of the model (Fig. 1) which complements the existing knowledge about cooperatives and public utilities. As mentioned in the introduction to this article, studies on natural monopoly concentrate mainly on its regulation (Grossman & Cole, 2003; Train, 1991; Spiller & Tommasi, 2008). Some even point to the impossibility of governance of utilities by cooperatives (see the polemic with Henry Hansmann in section five). At the same time, current research on electricity cooperatives, though abundant (Holstenkamp & Kahla, 2016; Holstenkamp et al., 2017; Müller et al., 2015; Rommel et al., 2018; Yildiz et al., 2015), does not include case studies on applying for a concession and governing such large utilities. The case study herein presented, determining its specific success factors and shortcomings in the process of running for the concession to Berlin's power grid by BEB, is unique and can become an inspiration for further research on this or similar cases in the future. It can also motivate other cooperatives in the world to take similar actions.

In addition, due to the lack of empirical research on different types of electricity/energy cooperatives as well as experimental work on choices and preferences made by cooperative members, which can explore the conditions for building trust, encouraging participation and dealing with conflicts (argument raised also by Yildiz et al. (2015)), further studies on these topics are strongly encouraged.

It would be revealing to conduct not only research on cooperative members, but also on consumers/pro-sumers, using the interdisciplinary and comparative perspective to investigate their role in growth of electricity cooperatives in different countries all over the world. That might be a starting point to broader analyses of economic, environmental and social patterns.

Finally, this paper analyses the cooperatives as a subject to manage public utilities, based on the example of the BürgerEnergie Berlin attempting to gain the concession to the Berlin power grid. Yet, it is important to acknowledge that this is only one of a few possible alternatives to the present status quo described in the third section of this paper. Another, powerful one, is the re-municipalisation of public goods and infrastructure (see the example of the Berliner Energietisch described earlier in this text) which, as an idea, attracts many citizens and politicians (especially from left-wing parties). Although these processes and movements were not the topic of this paper, these phenomena are of great significance and merit further investigation.

8. Conclusions and implications

The share of cooperatives in the energy market in Germany (with regard to energy from renewable sources in particular) has grown significantly over the last decade. Owing to the fact that they are represented by umbrella organisations, build networks and cooperate with other sectors, as well as are favoured by economic conditions (high

demand for renewable energy, despite higher prices, and a substantial price for supplying energy to the grid), they steadily generate significant profits for shareholders. The BEB case study analysed in this article shows that even in large cities they are successful and can, on an equal footing to giants such as Vattenfall, apply for a concession to purchase a large infrastructure. The analysis of BEB and its environment presented in this article was to answer the research question: what are the internal and external factors, as well as patterns and relationships among them, considered by BEB's environment as essential for the purchase of Berlin's power grid? It revealed success factors of such a venture – BEB provided a model that could be used by other energy cooperatives in Europe and elsewhere, as well as to serve as an inspiration to undertake similar challenges or to analyse their own position and capabilities. This strengthening of the cooperatives' position on the energy market can also be an important sign for public institutions and other companies in the industry.

This article also contributes to the existing knowledge on the topic of energy cooperatives by identifying three main benefits arising from the increasing number of energy cooperatives in the market and their energy infrastructure endeavours. First, all of the described objectives, assumptions and actions by BEB indicate that if this cooperative, together with the public institution, takes over the network, they will bring about a quick transformation of the old network into a modern smart grid, ensuring that in the future the network will become independent of energy sources coming from fossil fuels and distribute energy from renewables only. Secondly, this article may be important to other companies in the sector – the companies that need to adapt their production processes to the needs of the green market, as well as those for whom sustainability is essential. They can become shareholders in energy cooperatives or cooperate with them in some other capacity. The last advantage is associated with cooperating with the public sector, which is regarded as a partner by cooperatives (joint ownership of the network in this case). The public sector can appreciate cooperatives as democratic enterprises that come with money, and thus constitute a relief for local budgets when they decide to re-municipalise infrastructure.

The story of the grid and the BürgerEnergie Berlin cooperative is not over yet and has many nuanced layers that can be studied further. Despite various (and sometimes conflicting) future BEB scenarios imagined by its members, one thing is certain – they have already succeeded:

it is such a difference made in the city. [...] Even if they give the grid to Vattenfall, the company will be forced to implement more in terms of civil participation, more in terms of Energiewende. Still it would be a change, something which we have created together with the people of the city. (Colell, Interview)

Although electricity cooperatives might be perceived as 'new wine in old bottles' (after Pier Angelo Mori, 2013), the BEB case shows that there is a significant change in people's attitudes and a shift in values towards a more sustainable and ecological management of public utilities. Could it be that the Amory B. Lovins' road has been chosen by the people of Berlin?

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