Business Model Innovation for Sustainable Energy

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Business model innovation for sustainable energy:

how German municipal utilities invest in offshore wind energy

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ABSTRACT

Offshore wind energy is considered an effective and reliable source of power with tremendous potential for Germanys' future electricity supply. Due to the technology's capital intensity and high economic risk, however, offshore wind energy has so far been considered the domain of large electric utilities. Municipal utilities on the contrary traditionally have strong ties to their community and conduct low risk business models at the regional and local level. Recently, however, German municipal utilities started to invest in offshore wind energy. The present study identifies the business models of small and medium sized municipal utilities in the field of offshore wind energy. The investigation also reveals that municipal utilities are mainly driven by return expectations, political influence, and established business relationships. The study discusses the contribution of business model innovation for the German offshore wind energy market and derives practical recommendations for municipal utilities.

Keywords: Offshore wind energy; renewable energy; sustainable energy; business model; business model innovation; innovation management; municipal utility; energy transition.

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1. INTRODUCTION

The economic, social, and environmental value of technological innovation remains latent until the technology is brought to the market through an economically sustainable business model (Chesbrough, 2010). Hence, the business model is as important for large scale adoption of new technologies as the technology itself (Teece, 2010). Innovation scholars found that especially established companies often struggle to innovate their business model, which is still profitable, but whose future potential is likely to be undermined by changes in technology or the external environment (Christensen and Bower, 1996; Sosna et al., 2010). Such a challenge currently arises for electric utilities in the energy sector (Boscherini et al., 2011; Richter, 2011; Small and Frantzis, 2010), as a more sustainable electricity production based on renewable energies is found to be a key measure against climate change and resource depletion (IPCC, 2007). Hence, utilities need new innovative business models to commercialize renewable energy technologies on a large scale.

The German government intends to produce 80% of the countries' electricity from renewable energy sources until 2050 (BMWI and BMU, 2010). A major role in the future electricity supply is supposed to be played by offshore wind energy (BMU, 2002; Portman et al., 2009). This technology is considered an effective and reliable source of electric power with substantial growth potential in the coming decades (Bilgili et al., 2010; Esteban et al., 2010; Henderson et al., 2002). But offshore wind energy is characterized by high investment and operation costs (Green and Vasilakos, 2011). Financing has been and still is a major bottleneck and a challenge for most investors (Focht, 2011; PwC, 2011). Thus, it was expected that mainly large electric utilities will become active in offshore wind energy, because they are able to finance the projects on their balance sheet (Markard and Petersen, 2009; Stohlmeyer and Richter, 2008). Municipal utilities on the contrary were expected to contribute to the adoption of distributed renewable energies at the regional and local level (BMU and VKU, 2008). However, with the involvement 118 municipal utilities in the first German offshore wind farms, municipal utilities currently seem to advance to forerunners in this new and risky renewable energy technology (Köpke, 2011).

The aim of this paper is to understand, why local utilities invest in offshore wind energy and how they shape their business model to create value from these investments. The research question is: *How and why do German municipal utilities invest in offshore wind energy?*

The contribution of this paper is twofold: first, it adds to the discussion about utilities' business models for renewable energies and innovation management by pointing out how innovative business models help utilities to tackle the challenges of the energy transformation by commercializing renewable energy technologies. Second, the paper provides insights into current developments in the German offshore wind energy sector which is relevant for the economic and political debate about the market development.

The remainder of the paper is organized as follows. Section 2 provides an overview on the German offshore wind energy market and its investor structure. Furthermore, it outlines the business model concept as analytical perspective for this paper. Section 3 describes the methodology. While section 4 analyzes the different business models behind municipal utility

engagement, section 5 displays the results of a series of interviews with municipal utility managers. A discussion of the results is provided in section 6, followed by a conclusion in section 7.

2. BACKGROUND

2.1 The German offshore wind energy market

The German federal government has formulated ambitious expansion plans for offshore wind energy, because the technology plays a major role in reaching greenhouse gas reduction targets and national renewable energy targets (BMU, 2002). The country strives for an installed capacity of 10,000 megawatt (MW) until 2020 and 25,000 MW until 2030 (BMWI and BMU, 2010). As per June 2011, the authorities issued 30 permits for offshore wind energy projects in Germany. Of these projects 24 are located in the North Sea and six are located in the Baltic Sea.

Table 1: Permitted offshore wind energy projects in the German North Sea

Project name	*# WTGs*	*Current investor*	*Category*
1. Albatros	79	STRABAG; Norderland	FI, PD
2. Amrumbank West	80	E.ON	LU
3. Alpha Ventus	12	EWE, E.ON, Vattenfall	MU, LU
4. BARD Offshore 1	80	Unicredit Bank	FI, MU
5. Borkum Riffgrund 1	77	DONG Energy	LU
6. Borkum Riffgrund West	80	DONG Energy	LU
7. Borkum West II	80	Trianel	MU
8. Butendiek	80	wpd	PD
9. Dan Tysk	80	Vattenfall, SWM	LU, MU
19. Delta Nordsee (1+2)	32	E.ON	LU
11. Deutsche Bucht	42	Windreich	PD
12. North Sea Windpower	48	E.ON	LU
13. Global Tech I	80	Windreich, HSE, SWM, others	MU, PD
14. Godewind I	80	PNE Wind AG	PD
15. Gode Wind II	80	PNE Wind AG	PD
16. He dreiht I	119	EnBW	LU
17. Hochsee WP Nordsee	80	EnBW	LU
18. Meerwind (Süd + Ost)	80	Blackstone	FI
19. MEG Offshore I	80	NPrior, Windreich, Norderland	PD
20. Nordergründe	18	Energiekontor	PD
21. Nördlicher Grund	64	Blackstone	FI
22. Innogy Nordsee Ost	80	RWE	LU
23. Riffgat	30	EWE, Enova	MU, PD
24. Sandbank 24	96	Vattenfall	LU
25. Veja Mate	80	BARD	PD

* # WTG = Number of wind turbine generators.

** Category: LU = large utility, PD= project developer, FI= financial investor, MU=municipal utility.

Source: Dena 2011; BSH 2011; own research.

Table 2: Permitted offshore wind energy projects in the German Baltic Sea

Project name	*#WTGs**	*Current investor*	*Category***
1. Arkona Becken Südost	80	E.ON	LU
2. Beta Baltic	50	E.ON	LU
3. Baltic 1	21	EnBW	LU; MU
3. Baltic 2	80	EnBW	LU
4. GEOFReE	5	GEO	PD
6. Wikinger	80	Iberdrola	LU

* # WTG = Number of wind turbine generators.

** Category: LU = large utility, PD= project developer, FI= financial investor, MU=municipal utility.

Source: Dena 2011; BSH 2011; own research.

In addition to the permitted projects about 70 further projects are currently filed for approval at the responsible authority (Köppe and Schulze, 2010). However, in terms of installed capacity the German offshore wind energy development lags behind the political roadmap. The first German offshore wind energy projects Alpha Ventus and Baltic 1 started operation in 2010 and 2011. Together the two projects comprise an installed capacity of 108.3 MW. Two further projects, BARD offshore 1 and Borkum West 2, are currently under construction. Hence, a long way remains to reach the national targets of 10,000 MW until 2020.

Assuming an average project size of 400 MW, 25 wind farms have to be installed until 2020 and 58 until 2030 to reach the political goals. With average investment volumes of 1.5 billion Euros for a 400 MW project (Köppe and Schulze, 2010), this would lead to a total investment volume of 37.5 billion Euros until 2020 and 87 billion Euros until 2030. In these dimensions, even the large electric utilities like E.ON, RWE, and Vattenfall have limited financial resources. Thus, the question arises whether the current investors will be able to build and operate a sufficient number of projects to reach the political targets.

2.2 Offshore wind energy investors in Germany

The ownership structure of the approved German offshore projects has changed significantly from small to large investors in recent years (Markard and Petersen, 2009). Today, four major groups of investors can be distinguished: Independent project developers (PD), large utilities (LU), financial investors (FI), and municipal utilities (MU).

Table 3: Offshore wind energy investors in Germany

Investor category	*Absolute investments**	*Market involvement***	*Market share****
Large Utilities (LU)	16 out of 31	52%	42%
Independent project developers (PD)	11 out of 31	35%	29%
Financial Investors (FI)	4 out of 31	13%	11%
Municipal utilities (MU)	7 out of 31	23%	18%

* Numbers do not tally to 30, because seven projects have investors from more than one category.

** The percentage market involvement is calculated on the basis of 31 permitted projects. As some projects have investors from more than one category, the results do not add to 100%.

*** The percentage market share is calculated on the basis of 38.

Source: Dena 2011; BSH 2011; own research.

Independent project developers (PD) have initially developed the first offshore wind energy projects in Germany. They created the market by filing for construction permits and planning the projects. But these mainly small companies usually lack the financial resources to build and operate the projects. Therefore, many projects were sold to new investors, mainly large utilities. Some independent project developers are still active in the market, but it is unlikely that they will be financially able to realize a significant number of projects.

Large utilities (LU) constitute the first large wave of new investors. E.ON started in 2002, followed by Vattenfall in 2006, and subsequently RWE and EnBW in 2008. Today, the four large German utilities are involved in 15 of 31 permitted projects. Large utilities traditionally draw on their balance sheets to finance investment projects (Köppe and Schulze, 2010). A few years ago, it was argued that these financially strong investors would help to jump-start the market by realizing the first projects (Stohlmeyer and Richter, 2008). Thus, it was expected that offshore wind energy becomes the domain of large utilities (Markard and Petersen, 2009). Until today, the activity of large utilities in Germany remains limited. The projects of large utilities are in internal competition for funds with offshore wind projects in other geographic regions (especially the United Kingdom) and also with other capital-intensive conventional power projects (Lamsbach, 2010). Hence, the small number of large utilities in Germany is obviously not able to drive the offshore wind energy market in a satisfying way. This creates the need to attract other investor groups to provide sufficient capital to reach the ambitious German offshore wind energy targets.

Financial investors (FI), such as private equity investors or pension funds have been seen as potential new group of investors. It has been argued that offshore wind energy will become an attractive field for financial investors, because it provides large investment volumes and relatively stable returns, compared to the financial markets. For example, the financial investor Blackstone acquired the German offshore wind project Meerwind in 2008. Ultimately, only four financial investors are engaged in German offshore wind projects to date. The low level of interest can be explained with the lack of a functioning project finance market and relatively low return expectations (Köppe and Schulze, 2010).

Municipal utilities (MU) are a relatively new, but dedicated group of offshore wind investors. The first three commercial offshore wind farms are realized with substantial involvement of municipal utilities. A large number of small and medium municipal utilities has invested in offshore wind energy recently. Currently, 118 municipal utilities are involved in seven projects. Further projects are already announced. Given the scarcity of potential investors for offshore wind energy, municipal utilities could fill this gap with capital and innovative business models (Focht, 2011).

2.3 The business model concept as analytical tool

To address the hypothesis that municipal utilities could fill the investor gap and to answer the research question 'how and why do German municipal utilities invest in offshore wind energy?' this study refers to the literature on business models. Scholars see the business model as a valuable new tool for analysis and management in research and practice (Zott and Amit, 2008). It helps to expand the understanding of business phenomena by building generic categories and the development of ideal types. Thus, business models can function as "recipes" or "blueprints" that are ready for copying or variation and innovation (Baden-Fuller and Morgan, 2010). As a management tool, the business model helps managers to design, implement, operate, change, and control their business (Wirtz et al., 2010). Teece (2010) explains that the essence of a business model lies in defining the manner by which the enterprise delivers value to customers, entices customers to pay for value, and converts those payments into profits. Osterwalder and Pigneur (2009, 14) define a business model as *"the rationale of how an organization creates, delivers, and captures value".*

Business model innovation as a term remains largely unspecified in the current academic literature. As Chesbrough (2010) notes, business model innovation is less a matter of superior foresight, but of trial and error as well as ex-post adaption. Referring to the organizational learning literature, Sosna et al. (2010) understand business model innovation as strategic renewal mechanism for organizations facing changes in their external environment. In the present study it is understood as *the development of new organizational forms for the creation, delivery, and capture of value.*

Business model innovation becomes increasingly important for utilities, since the energy sector stands at the beginning of a huge transformation process towards a more sustainable production of electricity based on renewable energies (Small and Frantzis, 2010). Authors argue that new business models are the linchpin to the large-scale deployment of renewable energies (Duncan, 2010; Gordijin and Akkermans, 2007). This is because utilities are usually not developing and producing renewable energy technologies, they are applying them to generate electricity. Therefore, it is less about traditional technology innovation management which focuses on research and development activities (Levin and Barnard, 2008), but rather about finding new ways to successfully apply the technology in the market environment (Chesbrough, 2007). Therefore, utilities need to continuously innovate their business model for renewable energies and increase operational efficiency that same time if they want to be successful in the future energy landscape (Magnusson and Martini, 2008). First insights on

this issue for the field of solar energy have been provided by Frantzis et al. (2008), Nimmons and Taylor (2008), and Schoettl and Lehmann-Ortega (2010). The business model proved to be a valuable tool for research in this context. Therefore, the present study applies the business model as a tool of analysis to the activities of German municipal utilities in the field of offshore wind energy.

3. METHODOLOGY

The present study applies an explorative research design to gain first insights into municipal utilities' offshore wind activities. The research process comprises two steps.

The first step starts with the identification of municipal utilities' involvement in the different offshore projects. Subsequently the business model framework is used to identify generic approaches applied by municipal utilities. Data availability on these issues was a challenge, because details on the project structures are usually not published in publicly available sources. A solution was found in the inclusion of practitioner journals and presentations from practitioner conferences, which provided the necessary details and proved very fruitful for this research.

The second step of the research process aims to identify municipal utilities' motivations to invest in offshore wind energy. The investigation consists of a series of semi-structured interviews with representatives of municipal utilities (Silverman, 2009). The participants were managers involved in decisions about the offshore wind energy investment. The sample selection focussed on the 118 municipal utilities that are currently involved in offshore wind energy projects. The candidates were selected to cover all projects of interest and include municipal utilities of different size (Yin, 2003). In total, 11 interviews were conducted until it was found that a sufficient level of saturation was reached.

Table 4: Interviewed German municipal utilities

Municipal utility	*Rev 2009 (in m€)*	*Offshore investment*		
		Baltic 1	*BO1**	*BW 2***
Stadtwerke Düsseldorf AG	1,918	4.0 MW		
Stadtwerke Aachen AG	419			9.55 MW
Stadtwerke Flensburg GmbH	232			15.38 MW
Elektrizitätswerke Mittelbaden GmbH	202	2.5 MW	5.0 MW	4.5 MW
Allgäuer Überlandwerke GmbH	184			2.75 MW
Stadtwerke Tübingen GmbH	155		7.5 MW	
Stadtwerke Uelzen GmbH	102			2.31 MW
Stadtwerke Detmold GmbH	85			2.31 MW
Stadtwerke Hameln GmbH	82		2.5 MW	
Technische Werke Schussental GmbH	70	1.0 MW	1.0 MW	
Stadtwerke Ettlingen GmbH	69	2 MW		

*BO1= BARD Offshore 1

**BW2 = Borkum West 2

The interviews were conducted partly face-to-face and partly via telephone, based on a semi-structured questionnaire. The questionnaire comprised four sections: The first section was designed to learn about the specific investment. The second section allowed

participants to rank the importance of different motivations on a five point scale and to elaborate on the relevance in the individual corporate context. Section three includes questions on risk assessment and management. Finally, it was asked for further activities and the potential role for municipal utilities in the offshore wind energy market. The conversations were recorded and subsequently transferred to written protocols. The answers were clustered to derive general motivations for offshore wind energy investments and relate the answers to the findings from the document analysis. Because the participants asked for anonymity the quotes in the results section are provided without reference to the company name. By splitting the data collection process into two separate parts, it was possible to verify the information obtained from the document analysis and cross check the participant's answers with the facts. Overall, this approach made it possible to explore the issue in more detail.

4. MUNICIPAL UTILITIES' BUSINESS MODELS FOR OFFSHORE WIND ENERGY

This section aims to answer the first part of the research question: how do German municipal utilities invest in offshore wind energy?

Table 5: German offshore wind energy projects with municipal utility involvement

Project name	*In MW**	*Status of the project*	*MU's share*	*Involved MUs*
1. Alpha Ventus	60	In operation since 2010	47.5%	1
2. Dan Tysk	400	In advanced planning stage	49%	1
3. Global Tech 1	400	In advanced planning stage	73.9%	2
4. Riffgat	108	In planning stage	90%	1
5. Baltic 1	48.3	In operation since 2011	48.%	19
6. BARD Offshore 1	400	Under construction	100%	63
7. Borkum West 2	400	In advanced planning stage	100%	33

*MW = Megawatt

Source: Dena 2011; BSH 2011; own research.

To date, seven offshore wind energy projects have confirmed investments of municipal utilities. The seven projects displayed in table 3 comprise a difference in terms of the number of involved investors. The four projects Alpha Ventus, Dan Tysk, Global Tech 1, and Riffgat are realized by a small group of financially strong municipal utilities, namely EWE AG (EWE), Stadtwerke München GmbH (SWM), and HEAG Südhessische Energie AG (HSE). Due to their size and financial resources these municipal utilities are able to finance large investment volumes.

In contrast, the three projects Baltic 1, BARD Offshore 1, and Borkum West 2 are realized by 115 small and medium sized municipal utilities. The remainder of this article focuses on these three groups of small and medium sized companies, because the vast majority of the

To understand how municipal utilities invest in offshore wind energy, first the generic business model of an offshore project is presented and second the innovative elements are distilled from the three projects under analysis.

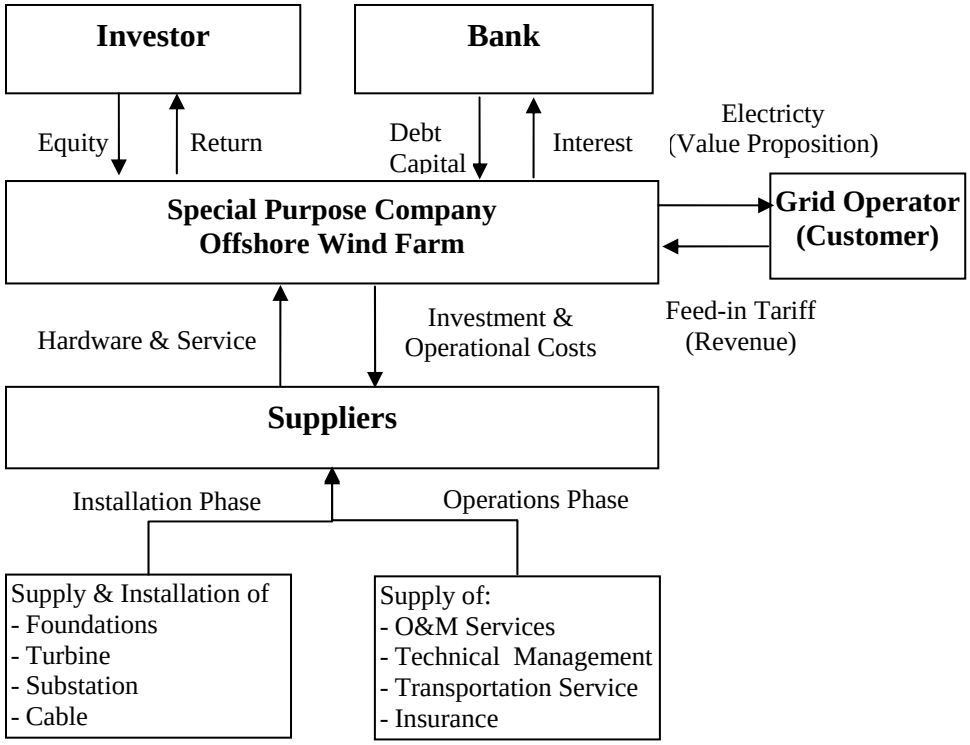

Figure 1: Abstract representation of an offshore wind farm business model

Figure 1 provides the basic business model template for offshore wind energy projects in Germany. All assets and contracts of the project are comprised in a special purpose company founded by the initiator of the project. The investor provides equity to develop the project and finance realization and operation. Debt by banks is either provided to the investor (corporate financing) or directly to the special purpose company (project financing). A range of suppliers is needed to develop, build and operate an offshore wind farm. Under the German feed-in law the electricity is sold to the grid operator for a fixed price per kilowatt hour. As pointed out earlier, the range of potential investors is limited due to the average equity requirements of about €500bn. Individual small and medium sized utilities are not able to provide a sufficient amount of equity to enter the offshore wind energy market. Therefore business model innovation efforts were focused on the financial side of the business model. Most of the business model remains the same, while the role of the investor is defined in an innovative way.

Two different business models for offshore wind energy can be found in the German market.

The projects BARD Offshore 1 and Borkum West 2 are realized following an approach that can be called the "joint venture" model. In this business model the role of the investor is fulfilled by two joint venture companies, established and owned exclusively by small and medium sized utilities. In both projects the joint venture companies bundle the resources of roughly 50 small and medium sized municipal utilities. The first joint venture company (figure 2 left side) is responsible for the development and management of the project. The second company (figure 2 right side) is a pure investment vehicle that owns the wind farm and offers shares for municipal utilities. This means both projects, BARD Offshore 1 and Borkum West

2, are owned and realized by municipal utilities. Both projects follow a so called "pre-completion" approach, which means that the investors buy their share before the project is realized. This means they bear the full economic risk of the project. The joint venture offshore business model can be displayed as follows:

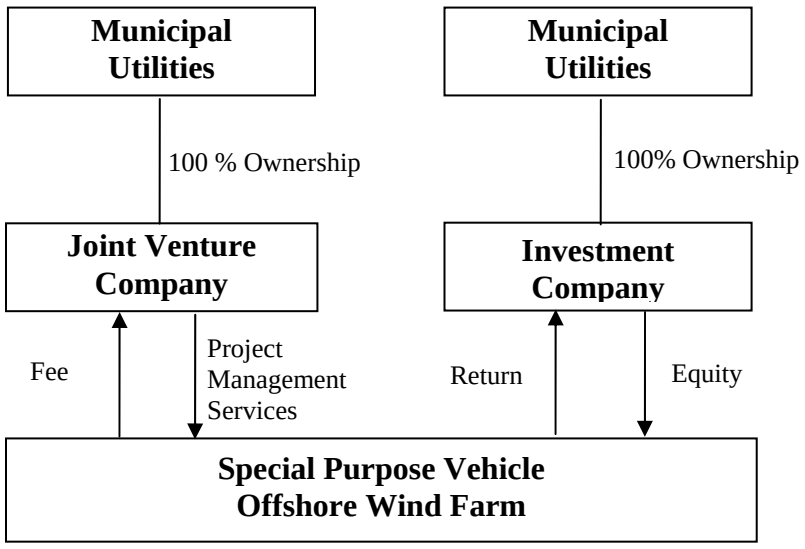

Figure 2: Abstract representation of the "joint venture" offshore business model

Source: based on Horstick, 2011; Morlock, 2011.

In contrast to the joint venture model, the business model for the Baltic 1 offshore wind farm follows another approach which can be called "lead investor" business model. The wind farm is owned by EnBW, one of the four largest German utilities. The utility acts as a lead investor and sells about half of the shares of the wind farm to a group of associated municipal utilities via an investment company (figure 3 right side). The lead investor also signs responsible for the project development and management. In the case of Baltic 1, the lead investor proposes a two step investment process in which the municipal investors first buy an option for a certain share of the wind farm. In a second step they can execute the option after the start of operation. The final investment decision has to be done after completion of the wind farm (“post-completion”). This model comprises a significantly lower risk profile for investing municipal utilities, because all risks of the construction phase are born by the lead investor. The motivation behind this offer is that the lead investor depends on good business relationship with certain small and medium sized municipal utilities.

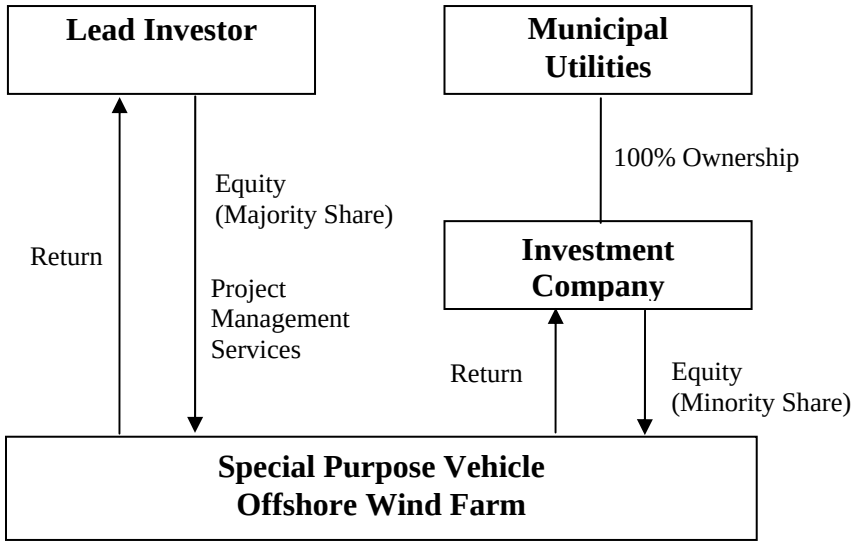

Figure 3: Abstract representation of the "lead investor" offshore business model
Source: based on Thiele, 2010.

Both business models allow small and medium sized municipal utilities to invest into offshore wind energy. While the joint venture model is basically open to all municipal utilities, the lead investor model requires a lead investor that is able and willing to offer investment opportunities. The advantage of the latter is the lower risk profile for investing municipal utilities. On the other hand, they remain more independent with the joint venture business model. Since the vast majority of the roughly 800 municipal utilities in Germany is of small and medium size, both business model innovations are of high value for the further development of municipal utilities business models for renewable energies and the German offshore wind energy market. The interest of small and medium sized utilities as well as large owners of offshore wind projects to realize further projects following one of these two approaches is high. Three owners of offshore wind farms have already publicly announced to be willing to involve a group of municipal utilities, namely EWE AG, DONG Energy AS, and EnBW (EWE, 2011; Köpke, 2011a). Which business model will be used is not publicly known yet.

5. MUNICIPAL UTILITIES' VIEW ON OFFSHORE WIND ENERGY INVESTMENTS

This section aims to answer the second part of the research question: Why do German municipal utilities invest in offshore wind energy? The following results have been obtained from a series of in-depth interviews with executives of German municipal utilities. The results are arranged in three subsections: motivations, risks, and outlook.

5.1 Motivations

This section aims to identify the motivations of small and medium sized municipal utilities to invest in offshore wind energy. Ten potential motivations have been identified from the literature review and expert consultations. The ten motivations are subsequently discussed with the representatives the municipal utilities.

Table 6: German municipal utilities' motivation to invest in offshore wind energy

Motivation	*Strong driver*	*somewhat driver*	*Neither nor*	*No real driver*	*definitely no driver*
1. Return expectation	7	4			
2. Political renewable energy targets	1	3	2	5	
3. Direct political influence	5	4	1	1	
4. Marketing and public relations	2	7		2	
5. Independence from large utilities		4	3	3	1
6. Scarcity of investment alternatives	1	3	2	4	1
7. Role of cooperation partners	4	6	1		
8. Favorable financing conditions	1	2	1	6	1
9. Convenience of investment	3	4	3	1	
10. Lack of own know how	3	2	4	1	1

Source: own research.

Return expectation

The results in Table 6 show that return expectation is the most important driver for municipal utilities' investment decisions. This point deserves some attention, because municipal utilities usually claim not to be as profit-oriented as investor owned utilities. One municipal utility manager explains: *"The rate of return is the main decision criteria for us as well. But our requirements are lower than what investor owned utilities expect."* The expected rates of return for offshore wind farms lie between *"6 and 11%"*. For example, the projected return on equity for the BARD Offshore 1 project is 9.3% (Morlock, 2011). If this is a good rate of return or not depends on the level of risk. At this point, the interviewed municipal utility managers have different opinions. Some are more or less satisfied: *"The expected rate of return lies above our normal return requirements which makes it financially attractive."* The larger part of interviewed managers seems to agree with the view that *"under real market*

conditions the return is too low for the risks involved." A manager admits that the expectations have become lower and more realistic over time: *"There was some euphoria in the beginning. We have learned a lot about offshore wind energy risks on the way."* Obviously, several managers have become more sensitive towards the risks involved and conclude that the risks are not sufficiently covered by the expected rate of return. It can be concluded that the different risk perceptions lead to different views on the expected rate of return and most managers perceive the rate of return as a bit too low (which should not be too surprising). One manager justifies *"Given the risks involved, the rate of return is too low for private investors. Municipal utilities can accept the rate of return, because we have a responsibility for society. Advancing the energy landscape is a common task and municipal utilities should take responsibility for this."*

Political renewable energy targets

Different political targets for renewable energies have been established on the EU level as well as on the national level. The German federal government intends to increase electricity supply from renewable sources to 35% until 2020, 50% until 2030, and 80% until 2050 (BMWI and BMU, 2010). In the eyes of the interviewed managers the political targets are no real driver or at best a limited driver for offshore wind investments. The main argument is that there is no obligation and thus no consequences. *"If we were obliged by law to reach the goals, we would of course comply. But why should we react on political targets that have no consequences for us?"* Another manager agrees, but qualifies: *"public pressure plays an important role. If you ignore or neglect renewable energies you might soon have a real image problem."* The answers reveal that the political targets themselves are no major driver for municipal utilities, but that they create indirect effects, such as change in public opinion or opinions at the local political level.

Direct political influence

German municipal utilities are vastly publicly owned enterprises. Therefore, seats in the supervisory board are often covered by local politicians. Corporate strategies and larger investments usually have to be agreed by the supervisory board. Hence, politicians can take direct influence on corporate decisions. As table 5 shows, the issue of direct political influence plays quite an important role for utility managers. One interviewed manager reports of direct political influence on corporate strategy in the field of renewable energies. In this case the public shareholder has demanded the formulation of ambitious renewable energy targets and a strategy of implementation. Another manager reports of a clear order to develop renewable energies as a new sector. Most interviewed managers do not face such a strong influence from their supervisory board. The majority rather describes a positive attitude towards renewable energy investments. *"Today, it is much easier for me to receive a positive investment decision for renewable energy projects than for conventional energy investments."* Thus, it can be concluded that political influence plays a significant role in renewable energy investments of municipal utilities.

Marketing and public relations

Public image becomes increasingly important for utilities as competition in the electricity market increases. Municipal utilities want to benefit from their image as responsible

enterprises. Straight out the interviewees underline the importance of their renewable energy engagement for marketing and public relation purposes. A share in an innovative project as an offshore wind farm can be communicated to customers and local politicians alike to demonstrate ecological responsibility and innovative engagement. As one interviewee put it *"No utility can afford not to follow some sort of renewable energy activity"*. These efforts can largely be interpreted as responses to increasing public awareness and pressure.

Independence from large utilities

The lion's share of the German electricity generation capacities is in the hands of a few large utilities. The majority of small and medium sized municipal utilities owns and operates only limited capacities, which makes them dependent on supply from the large utilities. The need to increase the independence of municipal utilities from the large multinational utilities is a frequent argument in the public debate in Germany. *"In general, independence from the big utilities is an important issue. In the case of offshore investments this plays a minor role, since offshore wind energy remains a financial investment for us."* Due to the current Renewable Energies Sources Act (EEG), electricity is fed into the grid for a fixed price per kilowatt hour. Thus, municipal utilities are not physically supplied with electricity from their projects. Instead, they receive a feed in tariff from the grid operator. Practically, municipal utilities take the same role as financial investors in this case. But a manager points out two strategic advantages: First, *"we can still use it for our 'virtual' portfolio. This means, we can still argue that the electricity we supply comes from renewable sources to a certain percentage"* and second, *"the offshore wind farms are replacing nuclear and fossil fuel capacities of the large utilities and increase the overall market share of municipal utilities in electricity generation."* An increased direct supply of electricity from renewable sources, which would lead to greater independence, is a matter of debate, but does not yet play a major role for the decision of the municipal utilities.

Scarcity of investment alternatives

The hypothesis behind this driver is that small and medium sized municipal utilities have problems to invest into other forms of renewable energy, because increasing demand for projects leads to increasing competition among investors. The interview results on this issue are heterogeneous and do not provide a clear picture. While some managers report of rich investment opportunities others have problems to find attractive projects. The latter find themselves in competition to more aggressive investors like large utilities and financial investors. Overall, this issue seems to have only limited influence on decisions to invest in offshore wind energy.

Role of cooperation partners

The experience and reputation of cooperation partners usually plays a major role for investors when high investment volumes are at the stake. This view is supported by the answers of the utility managers. The managers express a high level of trust to the three project management companies, EnBW, Trianel, and SWS. In most cases there have been relationships before the offshore wind energy investment. For example, most municipal utilities investing in the BARD Offshore1 and the Borkum West 2 project have been shareholders of the joint venture companies SWS and Trianel before. The municipal utilities

investing in the Baltic 1 project especially underline that the lead investor EnBW takes over a large part of the project risks and thus provides a high level of trust among his minority shareholders.

Favourable financing conditions

Municipal utilities as largely publicly owned companies usually have access to favorable financing conditions due to good credit ratings. They usually have to pay lower interest rates than private companies. With a given rate of return, cheaper capital allows a higher return. This is seen as an advantage, but it is clearly not seen as a driver for offshore investments.

Convenience of investment

The investment opportunities for the offshore wind projects Baltic 1, BARD Offshore 1, and Borkum West II are provided to the municipal utilities in a structured way. Interested municipal utility investors receive an information package which includes information on the project and evaluation reports by independent advisors. These independent reports cover issues such as the legal structure or the profitability of the project. This way, interested municipal utilities do not have to individually analyze the primary project documentation with all the contracts, reports and calculations as it usually done by investors. In this case, the municipal utilities rely on secondary literature. *"Well it is true, it's relatively quick and efficient. You realize a substantial investment without too much effort. This plays a role."* The structured investment approach thus addresses small and medium sized municipal utilities' needs by reducing transaction costs.

Lack of own know how

"Small and medium sized municipal utilities usually do not have the expertise and capacity to manage complex investment projects in addition to their day-to-day business. In the field of offshore wind energy we have a lack of know-how you cannot deny." Though many municipal utilities currently try to increase their knowledge and experience in the field of renewable energies, the majority of interviewed managers does not intend to build up significant expertise for offshore wind energy, because *"we'll never realize an offshore wind farm on our own anyhow."*

5.2 Risks

Besides the detailed look at motivations and drivers a thorough discussion on investment activities also requires to investigate the challenges and hurdles. Therefore, the managers were asked for their risk perception, risk assessment, and risk management strategies.

Risk perception

The main risks of offshore wind energy investments are seen in the construction phase and the operation phase.

The construction of the wind farm is considered risky, because there is very limited experience with installation of wind turbines under German offshore conditions. Experiences from Denmark and Great Britain are not directly comparable, because German projects are installed in greater distance from the coast in deeper water. This concern is especially

formulated by investors of BARD Offshore 1 and Borkum West 2, which are both located in the North Sea. In the case of the Baltic 1 project the minority investors were not exposed to a construction risk, because this was taken over by the lead investor.

The second major concern is the operation phase of the wind farm. The unknown question is, whether the technology is reliable in the long run. To date, there is no long term operational experience with multi-megawatt offshore wind turbines under offshore conditions in Germany. Issues like corrosion and turbine availability are seen as critical for the performance of the wind farm.

Risk assessment

The risk assessment of the investment opportunity is basically limited to the analysis of the provided information by independent advisors. *"We just read the reports and developed our opinion. As we have no real own expertise we have to trust the information provided to us."* Only two of the interviewed municipal utilities report of an explicit risk assessment process through a risk management department or an investment controlling. The others state to not follow an established risk assessment procedure. One manager describes: *"for the final risk assessment the managing director usually asks 'what happens when the investment totally fails?'"* This illustrates, that risk assessment follows a rather hands-on approach, based on experience and common sense of the municipal utility executives.

Risk management

In terms of risk management municipal utilities were asked what they do to actively reduce their risk exposure. The managers report that minority shareholders are provided with information, but they do not have direct influence on the project management. Hence, there is no opportunity for direct risk management activities. Consequently, risk management is limited to the municipal utility's corporate level. At the corporate level two risk management measures have been reported widely: First, municipal utilities limit the size of their investments. Investment volume is limited to an extent that even a complete write off of the investment creates no major harm for the company. Second, the municipal utilities diversify their renewable energy investments. To set off risks from offshore wind energy, municipal utilities also invest in onshore wind energy, biomass, and solar energy.

5.3 Outlook

The interest in offshore wind energy investments among small and medium sized utilities is currently very high. Except one, all interviewed managers consider further investments in offshore wind energy as an interesting option. So, most managers see their investment as a first step into a new future market. Also, interest from municipal utilities that have not yet invested in one of the projects is reported. But it is also been remarked frequently that the success of offshore wind energy in Germany will heavily depend on the experiences from the first realized projects.

The municipal utilities are self-confident and *"don't want to leave the offshore market to the large utilities alone."* Further potential for offshore wind energy projects with significant municipal utility involvement is expected. It is seen as a positive signal that the sector is

backed by political support. Concerning the role of small and medium sized municipal utilities, the interviewed managers agree that they will maintain a rather passive role. They see their position as strategic equity investors, not as active drivers of the development. *"We just wait and see what will be offered to us."* Thus, it can be concluded that municipal utilities can play a significant role in the German offshore wind energy market and help to overcome the equity bottleneck, but further management companies or lead investors are needed to actively drive and shape the market.

6. DISCUSSION

The first offshore wind farms in Germany are realized with significant involvement of municipal utilities. Through innovative business models municipal utilities entered this emerging new field of electricity generation. Two business models for the involvement of a large number of small and medium sized investors have been identified in the German market: the joint venture model and the lead investor model. Both models are based on the idea to offer small and medium sized utilities the opportunity to invest according to their individual risk carrying capacity. In the joint venture model, small and medium sized utilities organize project development through an independent management company and bear the full project risk. In the lead investor model, a large investor takes over management and parts of the risk, but includes further minority investor for strategic reasons. Further applications of the business model blueprints have already been announced. Therefore, it can be expected that small and medium sized municipal utilities will contribute to the realization of further offshore wind farms by providing capital.

Municipal utilities' engagement in offshore wind energy has a number of reasons of which return expectations, political influence and the existing relationship to the management company or the lead investor are the most important. Municipal utilities are willing to accept lower rates of return than private investors. They are more directly exposed to political influence and thus motivated to contribute to the realization of political targets. Trust to the management companies or lead investor is important for the investment decisions, as municipal utilities are passive minority investor. The investigation revealed that the passive role of small and medium sized municipal utilities is not likely change in the future. Thus, the results lead to the conclusion that small and medium sized municipal utilities can contribute to overcome the equity bottleneck and thus play a significant role in the German offshore wind energy market. But as they are and will remain passive investors, further management companies or lead investors are needed to actively drive and shape the market.

First applications of the business model concept in academic research on renewable energies have identified a special need to address utilities’ activities in the field of renewable energies, because utilities are by far the most important players in the energy sector (Duncan, 2010; Frantzis et al., 2008; Richter 2011). Research on utilities' business models for renewable energies has mainly focused on solar energy (Frantzis et al., 2008, Nimmons and Taylor, 2008; Schoettl and Lehmann-Ortega, 2010). To the author's knowledge, the present study is the first to apply the business model concept to the field of offshore wind energy. Academic research on offshore wind energy has mainly focused on technology and policy issues so far. Economic and financial questions (Green and Vasilakos, 2011; Spits, 2009) as well as the role of different actors have rarely been addressed (Markard and Petersen, 2009; Neukirch, 2008). Given the important role in Germany’s future energy supply and the extremely large investment volumes at stake (Toke 2010), a business model perspective on offshore wind energy is of high public importance. The present study contributes to the discussion in two ways: First, the analysis of business model blueprints is of high practical value for utilities considering investments in the field of offshore wind energy, in Germany and other European countries. It helps to understand the logic of value

creation as well as the risks and opportunities of offshore wind energy for small and medium sized investors. In addition, the blueprints provide the basis for further business model innovation. Second, the study contributes to the general discussion about utilities' business models for renewable energies and innovation management. The findings show how innovative business models allow entering new markets and creating new sources of revenue. This attests that business model innovation - understood as the systematic creation of new organizational forms for value creation, delivery, and capture - can function as strategic renewal mechanism to address the challenges of the energy transition (Sosna et al., 2010).

The explorative research approach seems to be well suited to gain first insights to the issue, but it comprises some limitations concerning the qualitative nature of the interviews. The data does not allow for precise evaluation of the drivers and motivations to invest into offshore wind energy due to the limited number of interviews. Also, the problem of social desirability might have affected the answers at some points.

This paper provides impetus for three promising avenues of further research: First, extended research on management and commercialization of sustainable energy technologies will help utilities to master the challenges of the energy transition. It will also benefit society as a whole by supporting the large scale adoption of renewable energies. Second, further research should concentrate on the economic challenges and opportunities of offshore wind energy. Given the expected investment volume of 87 billion Euros until 2030 in Germany alone, a deeper look into the economic aspects of offshore wind energy is important to reduce financial risks and allow a more effective allocation of funds. Also, more research and a more vivid public debate on offshore wind energy are important to secure public acceptance of this technology and the energy transition as a whole. Finally, the concept of business model innovation should be addressed more intensively to provide managers with new tools to manage industry change processes. In the case of the energy sector this could contribute to find new business models for a truly sustainable energy future.

7. CONCLUSION

The first offshore wind farms in Germany are realized with significant involvement of municipal utilities. Business model innovation made it possible for small and medium sized municipal utilities to participate in this emerging field of electricity generation. With this step, municipal utilities contribute to overcome the financing bottleneck in the offshore market and gain a stronger presence in the field of electricity generation. The insights of the present study allow to derive practical recommendations for municipal utility managers.

First, municipal utilities should strive to capture value from their first mover position in the field of offshore wind energy. Offshore wind energy is expected to have strong growth potential and substantially contribute to electricity supply. Thus, municipal utilities can gain a stronger position in energy industry by maintaining a leading role in this field. In this context risk management needs to play a more important role to ensure that the risks of the offshore investments are adequately covered in the long run.

Second, municipal utilities should substantially strengthen their business model innovation capabilities in order to successfully meet the challenges of the energy transition. As the transition process will change the energy landscape continuously, municipal utilities should pro-actively take the chances to adjust their business models for future challenges on an ongoing basis. For example, the offshore business model blueprints could be adapted for other fields of renewable energies. The cooperative ventures could be mandated to develop business models for residential renewable energy generation. Residential generation is another field untapped by the large utilities which could bear huge opportunities for municipal utilities.

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