Management of Investor Acceptance in Wind Power Megaprojects: A Conceptual Perspective

Nina Hampl
Institute for Economy and the Environment (IWÖ-HSG) University of St. Gallen
nina.hampl@unisg.ch

Rolf Wüstenhagen
Institute for Economy and the Environment (IWÖ-HSG), University of St. Gallen
rolf.wuestenhagen@unisg.ch

DOI 10.5592/otmcj.2012.3.1
Research Paper

INTRODUCTION TO THE PROBLEM – GOVERNMENTS THROUGHOUT THE WORLD ARE SEEKING TO GENERATE MORE OF THEIR DOMESTIC POWER FROM RENEWABLE ENERGY SOURCES. Power generation from wind energy is one of the most mature and important renewable energy technologies. On average, projects are steadily growing in size; the trend is towards large-scale wind power plants. Such wind power megaprojects, however, are often marked by high complexity, poor design, and poor delivery, which can diminish their attractiveness to investors.

Purpose – This paper aims to shed light on investors' willingness to finance wind power megaprojects and illuminate the ways in which not only risk and return factors of wind power megaprojects, but also behavioral and social factors influence this attitude, which we call investor acceptance. In addition, this paper examines ways in which megaproject managers can enhance and manage their project's attractiveness to investors.

Design/methodology/approach – This paper develops a conceptual model of investor acceptance of wind power megaprojects and its management based on insights from literature on behavioral finance, social acceptance of wind power projects, megaproject management and stakeholder management.

Findings – The paper concludes that investor acceptance of wind power megaprojects is theoretically prone to behavioral and social effects and that megaproject managers can influence investor acceptance through two different approaches: (1) indirectly (with respect to tactical project management) and (2) directly (related to stakeholder management).

Research implications – This paper broadens the scope of the research on investor acceptance by applying and further developing this concept in the context of megaprojects in the wind power industry and by discussing implications on megaproject management in a wind power context.

Keywords

Megaproject, Investor Acceptance, Behavioral Finance, Project Management, Wind Power

INTRODUCTION

Governments throughout the world are seeking to generate more of their domestic power from renewable energy sources with the common goal of decreasing both carbon emissions and the dependence on limited fossil fuels. Power generation from wind energy is one of the most mature and fastest-growing renewable energy technologies. Over the last 17 years, annual installations of wind power in Europe have continuously grown at an average rate of 15.6 % per year (EWEA, 2012a). Currently, 94 GW wind power capacity is installed in the European Union (GWEC, 2012). Most of the wind power installations in the European Union today range from small to mid-scale in size (the average onshore wind park size is about 10 MW[1]), but the size of projects is steadily increasing and the trend is for large-scale wind parks (EWEA, 2012a; IEA Wind, 2010). Particularly in the offshore wind power sector a number of very large-scale projects, so called "megaprojects" (Flyvbjerg *et al.*, 2003), are under construction so far, such as the British offshore wind park Greater Gabbard (500 MW) or the German offshore wind park Borkum West II (400 MW)[2] but this trend can also be witnessed onshore: the largest wind park in continental Europe is currently being built at Fântânele and Cogealac, Romania, with a capacity of 600 MW. The Romanian Black Sea coast (Constanţa county) offers very good wind conditions and will host several large-scale onshore wind parks in the 400-600 MW-class that are currently under construction or approved.

Megaprojects, in general, have several advantages such as synergies in construction and maintenance and better financing and purchasing conditions. But they are also characterized as "complex, politically-sensitive and involving a large number of partners" (van Marrewijk *et al.*, 2008: 591) and often suffer from negative project performance, i.e. they overrun budgets and fall behind schedule (e.g. the case of the London Array offshore wind park, see further below). These issues have important implications for construction companies as well as for other stakeholders such as project initiators, developers and investors. Negative project performance can, for instance, be attributed to the underestimation of costs (Flyvbjerg *et al.*, 2003) or the establishment of "misaligned or underdeveloped governance arrangements" (Sanderson, 2012). Research shows that cost estimation and forecasting is more prone to psychological biases (e.g. optimism) and politics (e.g. strategic misrepresentation) besides technical issues related to data and forecasting models (Flyvbjerg, 2006). Further, studies suggest that diverse and competing project cultures and rationalities (van Marrewijk *et al.*, 2008) and the unexpected increase of costs during construction (Merrow, 2003) paired with lack of ex post governing mechanisms to deal with extraordinary and unexpected events (Sanderson, 2012) contribute to poor megaproject delivery. A common issue with megaprojects that often hampers their effective design and delivery and thus positive project performance is that they operate in an environment of uncertainty (project outcomes and probabilities of entry unknown) rather than risk (project outcomes and probabilities of entry known) (Sanderson, 2012). Research particularly shows a positive relation between the level of technical, social, organizational and environmental complexity and uncertainty (Antoniadis *et al.*, 2011; Bosch-Rekveldt *et al.*, 2011; Giezen, 2012).

This brings up the question of how megaproject stakeholders – both in general terms and with regard to wind power megaprojects in particular – deal with this uncertainty when making their decisions. In this paper, we focus particularly on investors, whose importance as key stakeholders who provide financial backing without which projects could not exist. In addition, both empirical evidence and the literature show that "investor acceptance" plays a decisive role in determining the success or failure of wind power projects (IEA Wind, 2010) and renewable energy innovations in general (e.g. Wüstenhagen *et al.*, 2007). In the offshore wind power industry, for instance, non-recourse debt financing grew by 40% in 2011 and interest in offshore wind park investments has increased among equity investors (EWEA, 2012b). But the relatively young age of this industry still creates high risk for investors (specifically, with regard to technology and regulation, e.g. related to grid connection) and makes it more difficult for offshore developers to obtain funding for their projects (Prässler and Schaechtele, 2012). Increasing investor acceptance of offshore wind power projects is essential in the context of the European clean energy strategy. It would take more than a tenfold increase in capacity from 3.8 GW installed by the end of 2011 (EWEA, 2012b) to o achieve the target of 43 GW offshore wind power by 2020 set by the members of the European Union in course of their National Renewable Energy Action Plans (NREAP) (European Commission, 2010).

From a theoretical perspective, investor acceptance can be defined as the decision of financiers to invest in innovative technologies or projects. In the context of wind power, this concept is treated as part of a more comprehensive model of social acceptance as defined by Wüstenhagen *et al.* in 2007. The social acceptance model distinguishes between three distinct, yet interdependent dimensions: socio-political acceptance of a new technology (e.g. of the general public or policymakers), community acceptance (e.g. of the community and neighborhoods that are adjacent to infrastructure projects) and market acceptance (e.g. of consumers or investors). As this paper takes an investor acceptance perspective, it interprets the other two dimensions of social acceptance as policy risk (socio-political acceptance) and community acceptance risk, which both relate to the macro environment of a wind power (megaproject) investment. Such macro risk factors, along with other types of risks, which relate to a more technical micro context of a wind power project (e.g. technology risk, completion risk, and market risk), affect investors' risk-return assessment during the decision-making process.

In an investment context, risk is traditionally treated as "objective" (Ganzach, 2000) whereas empirical research shows that a more comprehensive theory of financial risk such as perceived risk, which also considers psychological mechanisms better explains investor behavior (e.g. Ganzach, 2000; Olsen, 2008; Slovic, 1992; Slovic *et al.*, 2004). Particularly scholars in the field of behavioral finance (e.g. Barberis and Thaler, 2003; Kahneman, 2003; Kahneman and Tversky, 1979; Shiller, 2003; Simon, 1955) provide evidence that psychological factors such as status quo bias, frame dependence, loss aversion or overconfidence affect investor behavior. They also show that their influence is specifically prevalent in the context of investment decision-making under uncertainty. Two examples from the offshore wind power industry illustrate the way in which behavioral and social factors might influence investment decision-making: first, that of the London Array offshore wind park, which had to deal with serious increases in cost due to the rising prices of steel and wind turbines before production began, which contributed to Shell's exit from the project in 2008.[3] Such rotation of key project stakeholders can have negative impact on project performance (Giezen, 2012) but can also alert other investors in the industry to reconsider their investment plans based on this information. The second example is the Hypo-Vereinsbank (HVB), one of the pioneers in project financing. The bank announced that it was setting aside reserves of 710 million euros due to considerable delay in one of its offshore wind parks – thus effectively issuing a warning to other banks that might be entering or planning to enter the offshore wind power industry.[4]

The example of the London Array offshore wind park also illustrates that investor acceptance is not static; in other words, even though an investor decides to finance a megaproject, investor acceptance can decrease over time due to different reasons and lead to a withdrawal of capital, and thus potentially induce project instability or failure. Deepening our theoretical understanding of the determining factors in the investment decision-making process under uncertainty and the management of issues related to investor acceptance in the context of very large-scale wind power projects thus forms a fruitful gateway to further research. More specifically, this paper seeks to respond to the following two questions:

- How do behavioral and social effects besides macro and micro risk factors in wind power megaproject investments influence investors' risk-return assessment, risk and return perceptions, and thus investor acceptance of wind power megaprojects?
- How can wind power megaproject managers positively influence investor acceptance i.e. through which mechanisms and elements?

This paper puts forward a conceptual model of investor acceptance of wind power megaprojects, drawing on insight gleaned from literature on behavioral finance, social acceptance of wind power projects, megaproject management, and stakeholder management. It aims at establishing a theoretical foundation to increase our understanding of investor acceptance and its implications on megaproject management in a wind power context – an approach that could conceivably be further developed as well as empirically verified and validated in future research. Moreover, the findings elaborated here provide insight that should prove beneficial not only to those who manage and/or invest in wind power megaprojects, but also to policymakers, consultants, and other stakeholders.

The paper proceeds as follows: first, the authors explore the concept of investor acceptance in greater depth and further put it in the context of investment decision-making under uncertainty. Next, they introduce a conceptual model of investor acceptance in wind power megaprojects based on insights from the literature review. Lastly, the authors discuss implications of investor acceptance on the management of wind power megaprojects and approaches to influencing and managing investor acceptance.

Theory

Investor Acceptance of Renewable Energy Technology

This paper specifically focuses on investors in wind power megaprojects as internal stakeholders who possess the capabilities and resources to highly influence the performance of a project (Atkin and Skitmore, 2008; Cleland, 1995; Lim *et al.*, 2005; Mitchell *et al.*, 1997). Megaproject investors, in this context, are defined as all equity shareholders of a wind power megaproject or project company (special purpose vehicle, SPV), i.e. for instance project sponsors, financial or institutional (e.g. infrastructure funds, private equity funds, pension funds) and strategic (e.g. power companies) investors and other stakeholders that hold an equity stake in a project or SPV such as project developers or technology producers (Sonntag-O'Brian and Usher, 2004; UNEP, 2012). We additionally include banks and other debt capital providers (e.g. mezzanine capital) into the definition of megaproject investors used in this paper as banks, in particular, typically provide large parts of project finance and are also subject to acceptance issues ("bankability of projects") (Lüdeke-Freund and Loock, 2011). The actual group of investors differs between projects (see e.g. EWEA, 2012b). The actual megaproject managers also vary between projects and can be project sponsors, project developers, consultants, or other service providers.

In general terms, investor acceptance can be defined as financiers' decisions to invest in innovative technologies or projects. This concept is related to the diffusion of innovations (Rogers, 2003), i.e. the adoption of innovative goods or services in consumer markets. If investors accept an investment opportunity or adopt a financial product, it means that they are willing to financially engage in a tangible asset (e.g. power generation project) or intangible asset (e.g. bond, stock, etc.) in return for economic gain. Investor acceptance also indicates an investor's decision as to whether or not to exit or disinvest over time.

In the context of wind power, investor acceptance was first introduced as part of a more comprehensive framework of social acceptance (Wüstenhagen *et al.*, 2007). In a narrower sense, social acceptance of wind power or renewable energy technology in general can be defined as the public support of such technology and routes back to the 1980s (Bosley and Bosley, 1988; Carlman, 1982, 1984; McDaniel, 1983; Thayer, 1988; Wolsink, 1987, 1988, 1989). Since then a large number of scholars have further developed and investigated this concept and its implications in more detail with respect to the impact of landscape issues (e.g. Pasqualetti, 2011a, b, c; Wolsink, 2007a), the influence of social acceptance on renewable energy diffusion (e.g. Toke *et al.*, 2008; Raven *et al.*, 2008) benefit and risk sharing (e.g. Wolsink, 2007a, b), and with respect to specific subtypes of renewable energy technology such as offshore wind power (e.g. Firestone and Kempton, 2007; Firestone *et al.*, 2009; Haggett, 2008).

While studies on the subject of social acceptance specifically build on public, political, and regulatory issues (Carlman, 1984), the conceptual model introduced by Wüstenhagen *et al.* (2007) takes a more holistic approach and integrates three dimensions: (1) socio-political acceptance; (2) community acceptance; and (3) market acceptance (see also Figure 1). In contrast to previous models, this one specifically references market acceptance in addition to public and political elements.

and community acceptance risk, complemented by legal and regulatory risk, can be treated as macro risk factors from a project investor's perspective. Further, investors differentiate a number of micro risk factors (e.g. structural risk, technology risk, completion risk) that are directly related to the specific wind power project. In general, wind power megaproject investments share the same risk

Figure 1 **The triangle of social acceptance of renewable energy innovation (Wüstenhagen *et al.*, 2007).**

Wüstenhagen *et al.* (2007) also emphasize the interdependence of these dimensions of social acceptance. Specifically important in this context, is the influence of socio-political and community acceptance on investor acceptance. On the one hand, an investor's risk and return assessment is highly influenced by the prevailing renewable energy support scheme, the amount of financial support or the stability of the political framework (Breukers and Wolsink, 2007). On the other hand, investors are sensitive to community acceptance issues since local resistance has a negative impact on the business case, i.e. it increases costs and extends the project development period (IEA Wind, 2010; Mormann, 2012). Both of these two risk factors, policy risk factors as investments in smaller-scale wind power projects, other renewable energy technology, and general infrastructure (mega)projects. Table 1 summarizes the risk factors that are involved in wind power investments.

Previous research related to investor acceptance of wind power is scarce (Wüstenhagen *et al.*, 2007). Past studies only focused on the buy side (investor's perspective) rather than both, the buy and the sell (in this case, the project manager's perspective) side. Further, scholars specifically investigated the influence of renewable energy policy frameworks (policy risk) and community acceptance (community acceptance risk) on investors' or project developers' willingness to invest in wind power projects.

Risk factors	Description	Market
Macro risk factors		
Legal and regulatory risk	Legal and regulatory risk is attributed to host government regulations, including currency risk, high taxes and royalties, demands for equity participation, expropriation and nationalization or political violence such as war, sabotage, or terrorism.	Farrell (2003); Yescombe (2002)
Policy risk	Policy risk arises from a possible negative change in national laws and provisions, i.e. if the national wind power support scheme is changed with negative impacts on wind power projects (e.g. reduction in feed-in tariff, requirements that a specific percentage of the components needs to be locally produced, abolishment of priority dispatch for electricity from renewable energy sources).	Lüthi and Wüstenhagen (2012); Wüstenhagen and Menichetti (2012)
Community acceptance risk	Community needs to be locally produced, abolishment negative attitude towards the actual installation of wind turbines and parks as local project development phase.	IEA Wind (2010); Wüstenhagen *et al.* (2007)
Micro risk factors		
Structural risk	Structural risk e.g. relates to the structure of the ownership of the project company (special purpose vehicle, SPV), quality of the sponsor and contractual risk sharing between parties.	SAM (2012)
Technology risk	Technology risk stems from the innovativeness or ongoing development of the technology used to produce the final output.	Farrell (2003); Fitch Ratings (2011)
Completion risk	Completion risk can be defined as the likelihood and the extent to which a project may incur construction delays or cost overruns.	Fitch Ratings (2011)
Operation risk	Operation risk mainly relates to a reduction in productivity (due to outages and or failure to meet expected performance standards) or may incur costs that are greater than projected.	Fitch Ratings (2011)
Supply risk	Supply risk is particularly attributed to the risk that the main input factor (wind) will not be available or not be available as projected.	Farrell (2003); Fitch Ratings (2011)
Market and revenue risk	Market risk mainly relates to revenue (return) components and stems from the possibility that the project may lose its competitive position in the output market, e.g. if the national wind power support scheme is changed in a negative manner (e.g. if the feed-in tariff is reduced).	Farrell (2003); Fitch Ratings (2011)

Table 1 **Overview of risk factors involved in wind power investments**

Bürer (2009), for instance, conducted qualitative interviews with investors and project developers in Switzerland in order to increase the understanding of investor acceptance of wind power projects. Key findings of this study show that investor acceptance generally follows local and social acceptance due to the various possibilities for locals, environmental groups, and the national landscape protection organization to oppose wind power projects. Further, high regulatory and administrative burdens in the permitting process, high development costs related to cabling, transportation of wind turbines (due to challenging topography) and decreased feed-in tariffs limit the attractiveness of the return on investment (ROI) for investors in wind power projects in Switzerland. Thus, this study highlights the importance of both, socio-political and community acceptance for investor acceptance of wind power projects. Studies on the intersection of renewable energy policy and investor acceptance also emphasize the importance of policy risk such as policy stability for international investors in wind power and other renewable energy projects in emerging economies (IWÖ-HSG, 2010), Europe (e.g. Breukers and Wolsink, 2007) and the U.S. (Barradale, 2010; Mormann, 2012). Lüthi and Prässler (2011) report from a survey among American and European project developers that aside from the level of total remuneration, non-economic barriers such as legal security and the administrative process duration greatly impact project developers' decisions regarding location.

Investment Decision-Making Under Conditions of Uncertainty

As already shown in the previous subchapter, investors in wind power megaprojects, but also in general, typically decide on their financial engagements through a process of carefully weighting risks and returns. Frameworks and mathematical models have been developed to support investors in their decision-making processes. However, there are two important issues that limit the application of traditional investment decision models in a context of megaprojects in general and specifically with respect to wind power megaprojects: (1) they assume that decisions are made in a context of risk rather than uncertainty; and (2) further consider financial risk as a purely statistical and objective concept without incorporating psychological factors.

Traditional investment decision frameworks and models mostly assume conditions of risk, i.e. decision-makers are able to assign mathematically or statistically derived objective probabilities to a range of known future events or outcomes (Knight, 1921). However, in the case of megaprojects, due to their high degree of complexity (Giezen, 2012), investors are often faced with conditions of uncertainty. Literature distinguishes two types of uncertainty: In the first type, decision-makers know the alternative future events or outcomes but are only able to assign subjective probabilities to them based on "expectations grounded in historical practice" (Sanderson, 2012: 435). In the second type, the "nature and range of future events or outcomes is unknown and unknowable, not simply hard to predict because of a lack of relevant data" and thus decision-makers are faced with a situation where the future is socially constructed over time with "little or no relation to the past or the present" (ibid.). The underlying assumption of this research paper is that megaproject investors normally treat and manage uncertainties as risks and assign probabilities to a range of future events or outcomes even though this practice might be questionable (Koppenjan *et al.*, 2010; Perminova *et al.*, 2008). Treating uncertainties as risks or simply ignoring them is even more problematic when investing in megaprojects in the offshore wind power industry. The reasons are an increased technological complexity and lacking past experience and historical data, which might even be exaggerated under specific geographical conditions, such as in the German offshore wind power industry. The German Federal Ministry for the Environment, for instance, emphasizes in this context that "the offshore wind energy usage in Germany with its prevailing requirements related to water depth and distance to coast is a completely new way of wind energy usage" (BMU, 2007: 113).

Thus, literature suggests, that the higher the degree of context-uncertainty the higher the degree of subjectivity in decision-making related to the particular context. A more comprehensive theory of financial risk that better explains this subjectivity in decision-making under uncertainty, is the concept of perceived risk, which views financial risk as "a multi attribute psychological phenomenon that involves other attributes besides probabilities and outcomes" (Olsen, 2008: 58). Such other attributes include, for instance, feelings, which are based on emotion and affect (Slovic *et al.*, 2004). This theory of risk specifically builds on the perspective that risk is "inherently subjective" and that it "does not exist out there, independent of our minds and cultures, waiting to be measured" (Slovic, 1992: 119).

However, independent of adopting this view of "pure subjectivity" scholars in this field agree that what actually influences human decisions are perceptions of risk and return rather than purely statistical risk and return values (Olsen, 2008). Ganzach (2000), for instance, further examined such risk and return judgments in a financial context and distinguished two different models depending on whether the investor is familiar with the financial asset or not. He showed that in case familiarity with financial assets is given, risk and return judgments are generated based on "appropriate ecological information" about risk and return values available through e.g. past experience or summary statistics from financial reports (ibid: 356). In case of unfamiliar assets, both risk and return judgments are derived from global preferences toward the assets. Further, the results of Ganzach's experiments suggest that although the ecological values of risk and return are positively related, perceptions of risk and return are not. The inverse relationship between perceived risk and return, which can be attributed to affect, has also been reported by other authors such as Alhakami and Slovic (1994), Finucane *et al.* (2000), and Finucane and Holup (2006).

Different studies from the behavioral finance literature further show in this context that investors tend to buy assets they are familiar with such as domestic stocks, as they (wrongly) perceive these assets to bear less financial risk (Coval and Moskowitz, 1999; French and Poterba, 1991; Grinblatt and Keloharju, 2001; Huberman, 2001; Wang *et al.*, 2011). Several behavioral finance scholars provide empirical evidence of other systematic biases[5] that influence investment decisions under uncertainty as well as risk and return perceptions (e.g. Barberis and Thaler, 2003; Kahneman, 2003; Kahneman and Tversky, 1979; Shiller, 2003; Simon, 1955) such as status quo bias, frame dependence, loss aversion or overconfidence.

Besides such cognitive or behavioral biases literature also shows the influence of social effects on investment decision-making and risk perception (e.g. Wang and Johnston, 1995; Wang *et al.*, 2001). A social phenomenon in financial markets is, for instance, herding, which refers to the behavior that investors are influenced by other investors' decisions. If their investment decision is different than the decision of other investors they alter their initial decision to follow the "crowd" (Bikhchandani *et al.*, 1992; Bikhchandani and Sharma, 2001; Froot *et al.*, 1992; Hirshleifer and Teoh, 2003). Related mechanisms are also discussed in the science and technology as well as diffusion of innovations literature, such as expectation dynamics (e.g. Wüstenhagen *et al.*, 2009) and peer effects (Rogers, 2003). Scholars define expectation dynamics as specific (related to a product or project) or general (related to the role of a particular technology in society) expectations about the future (Ruef and Markard, 2010), which might add momentum or create a hype cycle in an innovation diffusion process accelerating adoption and technological development (Borup *et al.*, 2006). Peer effects in the diffusion of innovations literature refer to that members of a social system adopt an innovation over time by means of communication through e.g. mass media and, specifically, the interaction between individuals (Rogers, 2003).

The influence of behavioral and social effects on investment decisions under uncertainty related to renewable energy technology has also been shown by various studies: Hampl *et al.* (2012), for instance, reveal that venture capitalists' investments in renewable energy start-ups are strongly influenced by social networks; Chassot *et al.* (2012) provide empirical evidence suggesting that venture capitalists' underinvestment in renewable energy deals can be explained by a policy aversion bias; Lüdeke-Freund and Loock (2011) show that banks' financing decisions with regard to large-scale photovoltaic projects are prone to a "debt for brands" bias related to the photovoltaic modules that are implemented in the project.

Conceptual model of investor acceptance in wind power megaprojects

Based on insights from our literature review in the previous chapters of this paper, we introduce a conceptual model of investor acceptance in wind power megaprojects in Figure 2. This model builds on previous work and extends it in two ways: (1) by explicitly distinguish-

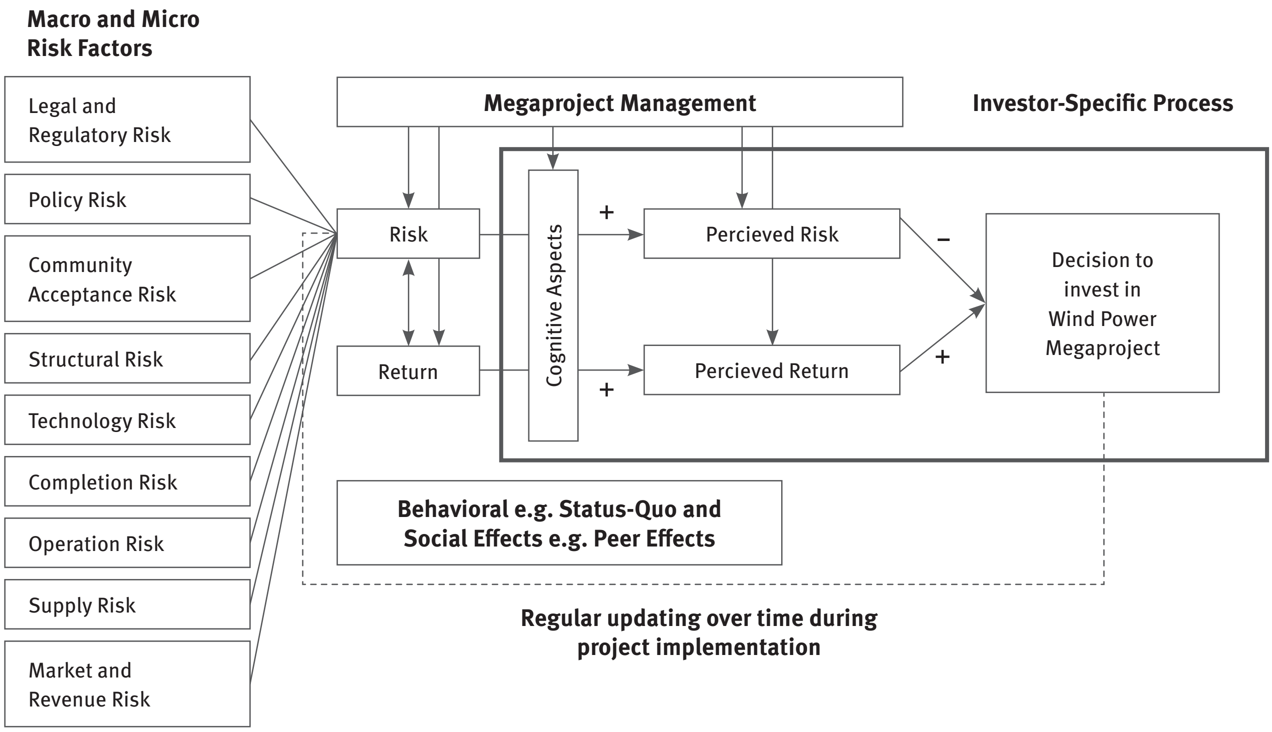

Figure 2 Conceptual model of investor acceptance of wind power megaprojects (relations between (percieved) risk and return attributes based on Ganzach, 2000; overall model adapted from Wüstenhagen and Menichetti, 2012)

ing between the influence of behavioral (e.g. status quo bias, overconfidence) and social effects (e.g. peer effects) besides macro and micro risk factors (e.g. policy risk, community acceptance risk, technology risk) on investment decisions in wind power megaprojects; and (2) by illustrating how megaproject managers can positively influence investor acceptance, which will be the explicit subject of the following chapter of this paper.

The conceptual model as depicted in Figure 2 shows that information about actual macro and micro risk factors of the underlying wind power megaproject have a positive relationship to return factors of such projects, i.e. if risks increase, investors demand a risk compensation and thus higher returns on their investment. This information about actual risk and return values further influence investor-specific perceptions about risks and returns related to the project investment (Ganzach, 2000). In course of this cognitive process of risk-return assessment several behavioral (e.g. status quo bias, overconfidence) or social (e.g. peer effects) biases or effects might occur, which directly influence risk and return perceptions (e.g. Kahneman, 2003; Olsen, 2008). Specifically social effects are relevant in the context of wind power megaprojects. The decisions of investors, but also the decisions of other industry players such as EPCs (engineering, procurement and construction contractors) or technology producers, can have a much wider impact that even goes beyond the affected project by acting as references and thus by influencing future investor acceptance of large-scale and complex wind power projects. This is what we, for instance, refer to as "peer effects" in this specific context. The risk and return judgments finally affect an investor's decision whether to invest in a wind power megaproject or not. This whole process of risk-return evaluation and decision-making is regularly updated over time during project implementation, i.e. although if investor acceptance is achieved at a certain stage of the project, this is no guaranty that it will remain stable over time (see, for instance, the London Array case where Shell exited during project implementation).

The conceptual model in Figure 2 further shows which elements of the investment decision-making process megaproject managers can influence in order to increase investor acceptance. More detailed explanations related to these mechanisms and managerial implications are subject of the following chapter.

Managerial Implications

Management of Projects and Stakeholders

The Project Management Institute (PMI) [6] defines a project as "a temporary group activity designed to produce a unique product, service or result" and thus project management as "the application of knowledge, skills and techniques to execute projects effectively and efficiently". Project management and project management training in a narrower sense is more tactical and execution focused dedicated to optimizing time and cost factors (Eweje, Turner, and Müller, 2012). But due to their scale, duration, and far-reaching impact, megaprojects additionally require a more strategic management and decision-making approach. An important element of strategic project management is the management of stakeholder interests. Stakeholder management in a megaproject context, thus, puts high emphasis on the identification, analysis, and management of key stakeholders and the establishment of effective governance structures (Dunoviţ, 2010; Eweje *et al.*, 2012).

Stakeholder management is a traditional strategic management instrument routed in stakeholder theory in the context of organizations (Freeman, 1984). Transferred from a corporate level to the management of construction projects, Newcombe (2003: 842) defines stakeholders as any "groups or individuals who have a stake in, or expectation of, the project's performance", which includes "clients, project managers, designers, subcontractors, suppliers, funding bodies, users and the community at large". Literature provides different classifications of stakeholders such as according to their involvement in a project (internal versus external stakeholders) (e.g. Freeman, 1984; Gibson, 2000), their power and legitimacy (Johnson *et al.*, 2005; Mitchell *et al.*, 1997; Newcombe, 2003) or their position towards a project (e.g. McElroy and Mills, 2007). Meeting the expectations of stakeholders over the life cycle of a construction project is mandatory for a successful project delivery as stakeholders can have the power to delay or even stop projects (Atkin and Skitmore, 2008; Cleland, 1995; Lim *et al.*, 2005; Mitchell *et al.*, 1997).

Figure 3 gives an overview of typical stakeholders involved in wind power (mega)projects. In megaprojects often more than one firm or individual can be attributed to a stakeholder type. Sometimes one firm or individual takes over multiple stakeholder roles.

Approaches to Influencing and Managing Investor Acceptance

From a megaproject manager's perspective investor acceptance can be influenced over two different routes[7]: (1) indirectly through tactical project management focusing on project performance in terms of time and costs (as project performance has a high impact on investor acceptance); and (2) directly through the active management of investor acceptance as part of stakeholder management and governance. Both approaches are essential in order to achieve high investor acceptance as they target two different elements of the investor acceptance model (see Figure 2) as elaborated in the following paragraphs.

Tactical project management particularly influences the macro and micro risk factors (excluding risks that can only

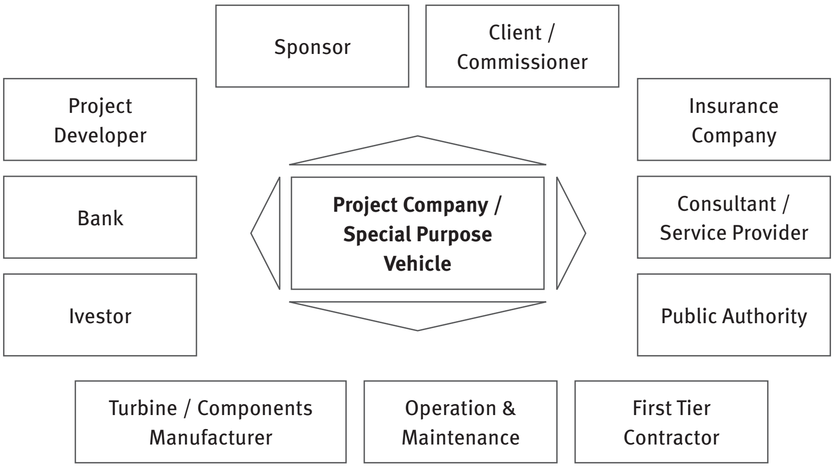

Figure 3 **Typical stakeholders of a wind power (mega)project (own figure based on Richter, 2009; Stohlmeyer and Küver, 2002)**

be influenced by other stakeholders and force majeure risks). Some of these risks are also influenced by strategic project management techniques such as external stakeholder management (community acceptance risk). In general, risks are managed through an adequate risk management process that typically comprises the steps of initiation, identification, analysis, planning, monitoring, and control (risk retention, transfer, reduction and avoidance) (e.g. Chapman, 1997; Akintoye and MacLeod, 1997; Perminova *et al.*, 2008). In order to manage community acceptance risks managers of wind power megaprojects can adopt different benefit and risk sharing models, such as co-ownership through community funds or power contracting, in order to increase the community acceptance of projects. A more comprehensive model of stakeholder management with the objective to increase social acceptance of renewable energy technology projects is the ESTEEM methodology[8], which might also be applied to manage investor acceptance issues. How megaproject managers treat and manage such risks, and thus ensure positive project performance, has high influence on an investor's risk-return assessment and thus on investor acceptance. Therefore, this is what we summarize as the indirect influence on investor acceptance.

The investor's perceived risks (and returns) that are for instance influenced by behavioral and social factors such as actions by peers or other industry players, are harder to influence and manage. Typically, the investor acceptance risk (specifically related to exit or disinvestment over the lifecycle of a megaproject) is treated through contractual arrangements. Besides adequate contracts this active investor acceptance management also includes investor relationship management as part of stakeholder management activities and strategic megaproject management (Eweje *et al.*, 2012). Relationship management should specifically target the perceptions of risks and returns that investors hold with regards to a financial engagement in wind power megaprojects. This can comprise techniques such as active communication, negotiation, or the offering of incentives (Chinyio and Akintoye, 2008).

The management of investor perceptions is important in both stages of an investment cycle: (1) the pre-contractual phase of opportunity identification and assessment; and (2) the post-contractual phase of investment management (e.g. decision to exit or disinvest). Negative (e.g. no investment interest at all) or decreased investor acceptance over the lifecycle of a project may have negative impact on project performance in terms of time and budget overruns. This active and ongoing management of investor acceptance relates to the common tenor of recent literature in the megaproject management field with regards to megaproject governance. Scholars emphasize the importance of "governing" practices in terms of a dynamic process versus a static establishment of processes and practices in course of the project planning stage ("governance") (Sanderson, 2012).

Figure 4 summarizes the two approaches how to influence and manage investor acceptance.

CONCLUSIONS

The energy industry is undergoing a fundamental transformation, which has been coined a "global energy technology revolution" by the International Energy Agency (IEA, 2008). In search of

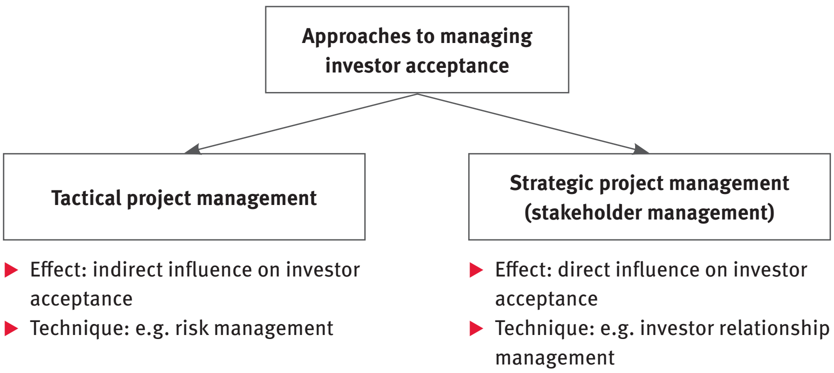

Figure 4 **Approaches to managing investor acceptance**

a sustainable energy supply, governments around the globe have set the goal to grow the supply of energy from renewable sources. As a consequence, there is a need to significantly scale up previous levels of investment in renewable energy. Specifically important in this context, is the financing of wind power as one of the most mature and fastest-growing renewable energy technologies. As the trend in this industry, in both sectors, onshore and offshore, is for very large-scale wind power projects the average project gets more complex in technical, social, organizational and environmental terms and thus more uncertain. In the offshore wind power industry this uncertainty is even higher as this market sector is still in earlier stages of development than the established onshore sector. The question arises how key stakeholders like investors deal with this increased uncertainty inherent to such wind power megaprojects and how megaproject managers can positively influence and manage investor acceptance.

In this contribution we introduce a conceptual model of investor acceptance of wind power megaprojects and approaches how to manage investor acceptance based on insights from the literature on behavioral finance, social acceptance of wind power projects, megaproject management and stakeholder management. This conceptual model could be used as a starting point to further investigate the issue of investor acceptance in a wind power megaproject context particularly in course of empirical studies such as case studies or surveys of investors and megaproject managers. Findings will generate valuable insights for managers and investors of wind power megaprojects but also for other stakeholders such as policymakers and consultants. Potentially it will also be possible to draw lessons for other energy sectors (e.g. gas-fired power stations or pipelines, electricity transmission grids) or even across infrastructure sectors (e.g. transportation) that specifically have to deal with investor acceptance issues.

An interesting feature of the offshore wind power market is a shift in the type of investors. While these capital-intensive projects have traditionally be financed by strategic investors such as power companies that are used to build centralized and very large-scale power plants the investor base in such projects is getter more diverse (e.g. pension funds or other financial investors). With new types of investors with differing investment strategies, rationalities, and risk appetites entering the wind power scene analyzing investor acceptance and its management gets even more relevant. Further studies on this issue, both conceptual and empirical ones, might thus specifically focus on differences in risk-return assessment, risk perceptions and return expectations as well as management aspects between these various types of wind power megaproject investors.

Footnotes

[1] Own calculations based on http://www.thewindpower.net/windfarms_list_en.php (accessed 27 November 2012).

[2] The EWEA (2012b) shows that the average size of offshore wind power projects being planned in Europe is about 555 MW.

[3] http://www.handelsblatt.com/unternehmen/industrie/zweifel-am-weltgroessten-offshore-projekt-london-array/3101228.html?p3101228=all; http://www.handelsblatt.com/technologie/energie-umwelt/energie-technik/oelriesen-aendern-gruene-strategie/2954516.html (accessed 27 November 2012).

[4] http://www.handelsblatt.com/unternehmen/banken/offshore-windparks-finanzinvestoren-sind-risiken-auf-hoher-see-zu-gross/6518072.html (accessed 27 November 2012).

[5] The question remains whether this deviation from the efficient market hypothesis (Fama, 1991) is a bias to fully rational behavior rather than a facet of rationality in order to deal with the uncertainty in decision-making (e.g. Todd and Gigerenzer, 2003).

[6] http://www.pmi.org/en/About-Us/About-Us-What-is-Project-Management.aspx (accessed 27 November 2012).

[7] We particularly focus on “risk” and “risk perceptions” in the following paragraphs, as we assume in our conceptual model a positive relationship between risk and return factors, between risk and perceived risk as well as between return and perceived return factors.

[8] For more information on this methodology, please refer to http://www.esteem-tool.eu (accessed 27 November 2012).

References

Akintoye, A.S. and MacLeod, M.J. (1997), “Risk analysis and management in construction”, *International Journal of Project Management*, Vol. 15 No. 1, pp. 31-38.

Alhakami, A.S. and Slovic P. (1994), “A psychological study of the inverse relationship between perceived risk and perceived benefit”, *Risk Analysis*, Vol. 14 No. 6, pp. 1085-1096.

Antoniadis, D.N., Edum-Fotwe, F.T. and Thorpe, A. (2011), “Socio-organo complexity and project performance”, *International Journal of Project Management*, Vol. 29 No. 7, pp. 808-816.

Atkin, B. and Skitmore, M. (2008), “Stakeholder management in construction”, *Construction Management and Economics*, Vol. 26 No. 6, pp. 549-552.

Barberis, N. and Thaler, R. (2003), “Chapter 18: A survey of behavioral finance”, in Constantinides, G.M., Harris, M. and Stulz, R.M. (Eds.), *Handbook of the Economics of Finance*, Vol. 1 Part 2, Elsevier, pp. 1053-1128.

Barradale, M.J. (2010), “Impact of public policy uncertainty on renewable energy investment: wind power and the production tax credit”, *Energy Policy*, Vol. 38, pp. 7698-7709.

Bikhchandani, S. and Sharma, S. (2001), “Herd behavior in financial markets”, IMF, Staff Papers, Vol. 47 No. 3, pp. 279-310.

Bikhchandani, S., Hirshleifer, D. and Welch, I. (1992), “A theory of fads, fashions, customs and cultural change as informational cascades”, *Journal of Political Economy*, Vol. 100 No. 5, pp. 992-1026.

BMU (2007), “EEG-Erfahrungsbericht 2007”, Bundesministerium für Umwelt, Naturschutz und Reaktorsicherheit (BMU), available at: http://www.erneuerbare-energien.de/files/pdfs/allgemein/application/pdf/erfahrungsbericht_eeg_2007.pdf (accessed 27 November 2012).

Borup, M., Brown, N., Konrad, K. and Van Lente, H. (2006), “The sociology of expectations in science and technology”, *Technology Analysis and Strategic Management*, Vol. 18 Nos. 3/4, pp. 285-298.

Bosch-Rekveldt, M., Jongkind, Y., Mooi, H., Bakker, H. and Verbraeck, A. (2011), “Grasping project complexity in large engineering projects: The TOE (Technical, Organizational and Environmental) framework”, *International Journal of Project Management*, Vol. 29 No. 6, pp. 728-739.

Bosley, P. and Bosley, K. (1988), “Public acceptability of California’s wind energy developments: three studies”, *Wind Engineering*, Vol. 12 No. 5, pp. 311-318.

Breukers, S. and Wolsink, M. (2007), “Wind power implementation in changing institutional landscapes: an international comparison”, *Energy Policy*, Vol. 35 No. 5, pp. 2737-2750.

Bürer, M.J. (2009), Investor acceptance of wind energy in Switzerland, Bundesamt für Energie, Bern, Switzerland, 2009.

Carlman, I. (1982), “Wind energy potential in Sweden: the importance of non-technical factors”, proceedings of the Forth International Symposium on Wind Energy Systems in Stockholm, Sweden, 1982, Stockholm, pp. 335-348.

Carlman, I. (1984), “The views of politicians and decision-makers on planning for the use of wind power in Sweden”, proceedings of the European Wind Energy Conference in Hamburg, Germany, 1984, Hamburg, pp. 339-343.

Chapman, C. (1997), “Project risk analysis and management: PRAM the generic process”, *International Journal of Project Management*, Vol. 15 No. 5, pp. 273-281.

Chassot, S.; Hampl, N. and Wüstenhagen, R. (2012), “Policy aversion bias and the financing of clean energy innovation”, working paper, Institute for Economy and the Environment, University of St. Gallen, St. Gallen, Switzerland, July 2012.

Chinyio, E.A. and Akintoye, A.S. (2008), “Practical approaches for engaging stakeholders: findings from the UK”, *Construction Management and Economics*, Vol. 26 No. 6, pp. 591-599.

Cleland, D.J. (1995), *Project Management Strategic Design and Implementation*, McGraw-Hill, Singapore.

Coval, J.D. and Moskowitz T.J. (1999), “Home bias at home: local equity preference in domestic portfolios”, *Journal of Finance*, Vol. 54 No. 6, pp. 2045-207

Dunović, I.B. (2010), “A study of project governance frameworks for large infrastructure projects with reflection on road transport projects”, *Organization, Technology and Management in Construction*, Vol. 2 No. 1, pp. 145-155.

European Commission (2010), National Renewable Energy Action Plans, available at: http://ec.europa.eu/energy/renewables/action_plan_en.htm (accessed 27 November 2012).

EWEA (2012a), “Wind in power: 2011 European statistics”, European Wind Energy Association (EWEA), available at: http://www.ewea.org/fileadmin/files/library/publications/statistics/Wind_in_power_2011_European_statistics.pdf (accessed 27 November 2012).

EWEA (2012b), “The European offshore wind industry key 2011 trends and statistics”, European Wind Energy Association (EWEA), available at: http://www.ewea.org/fileadmin/ewea_documents/documents/publications/statistics/EWEA_stats_offshore_2011_01.pdf (accessed 27 November 2012).

Eweje, J., Turner, R. and Müller, R. (2012), “Maximizing strategic value from megaprojects: The influence of information-feed on decision-making by the project manager”, *International Journal of Project Management*, Vol. 30 No. 6, pp. 639-651.

Fama, E.F. (1991), “Efficient capital markets: II”, *Journal of Finance*, Vol. 46, pp. 1575-1617.

Farrell, L.M. (2003), “Principal-agency risk in project finance”, *International Journal of Project Management*, Vol. 21 No. 8, pp. 547-561.

Finucane, M.L. and Holup, J.L. (2006), “Risk as value: combining affect and analysis in risk judgments”, *Journal of Risk Research*, Vol. 9 No. 2, pp. 141-164.

Finucane, M.L., Alhakami, A.S., Slovic, P. and Johnson S.M. (2000), “The affect heuristic in judgments of risks and benefits”, *Journal of Behavioral Decision Making*, Vol. 13 No. 1, pp. 1-17.

Firestone, J. and Kempton, W. (2007), “Public opinion about large offshore wind power: underlying factors”, *Energy Policy*, Vol. 35 No. 3, pp. 1584-1598.

Firestone, J., Kempton, W. and Krueger A. (2009), “Public acceptance of offshore wind power projects in the USA”, *Wind Energy*, Vol. 12 No. 2, pp. 183-202.

Fitch Ratings (2011), Global infrastructure & project finance: rating criteria for onshore wind farm debt instruments, Fitch Ratings, April 2011.

Flyvbjerg, B. (2006), “From Nobel prize to project management: getting risks right”, *Project Management Journal*, Vol. 37 No. 3, pp. 5-15.

Flyvbjerg, B., Bruzelius, N. and Rothengatter, W. (2003), *Megaprojects and risk: an anatomy of ambition*, Cambridge University Press, Cambridge, UK.

Freeman, R.E. (1984), *Strategic Management: A Stakeholder Approach*, Pitman Publishing Inc., Boston, MA.

French, K.R. and Poterba, J.M. (1991), “Investor diversification and international equity markets”, *American Economic Review*, Vol. 81 No. 2, pp. 222-226.

Froot, K., Scharfstein, D. and Stein, J. (1992), "Herd on the street: informational efficiencies in a market with short-term speculation", *Journal of Finance*, Vol. 47 No. 4, pp. 1461-84.

Ganzach, Y. (2000), "Judging risk and return of financial assets", *Organizational Behavior and Human Decision Processes,* Vol. 83 No. 2, pp. 353-370.

Gibson, K. (2000), "The moral basis of stakeholder theory", *Journal of Business Ethics*, Vol. 26 No. 3, pp. 245-257.

Giezen, M. (2012), "Keeping it simple? A case study into the advantages and disadvantages of reducing complexity in mega project planning", *International Journal of Project Managemen*t, forthcoming.

Grinblatt, M. and Keloharju, M. (2001), "How distance, language, and culture influence stockholdings and trades", *Journal of Finance*, Vol. 56 No.3, pp. 1053-1073.

GWEC (2012), "Global Wind Report: Annual market update 2011", Global Wind Energy Council (GWEC), available at: http://gwec.net/wp-content/uploads/2012/06/Annual_report_2011_lowres.pdf (accessed 27 November 2012).

Haggett, C. (2008), "Over the sea and far away? A consideration of the planning, politics and public perception of offshore wind farms", *Journal of Environmental Policy & Planning,* Vol. 10 No. 3, pp. 289-306.

Hampl, N., Wuebker, R. and Wüstenhagen, R. (2012), "A joint test of status hierarchies and personal ties in VC decision-making", paper presented at the Academy of Management (AOM) Annual Meeting, 3-7 August, Boston, MA.

Hirshleifer, D. and Teoh, S.H. (2003), "Herd behaviour and cascading in capital markets: a review and synthesis", *European Financial Management*, Vol. 9 No. 1, pp. 25-66.

Huberman, G. (2001), "Familiarity breeds investment", *Review of Financial Studies*, Vol. 14 No. 3, pp. 659-680.

IEA (2008), "Now or never: IEA Energy Technology Perspectives 2008 shows pathways to sustained economic growth based on clean and affordable energy technology", International Energy Agency (IEA), available at: http://www.iea.org/press/pressdetail.asp? PRESS_REL_ID=263 (accessed 27 November 2012).

IEA Wind (2010), "IEA Wind Task 28: social acceptance of wind energy: state of the art report", International Energy Agency (IEA) Wind, available at: http://www.socialacceptance.ch/images/IEA_Wind_Task_28_technical_report_final_20110421.pdf (accessed 27 November 2012).

IWÖ-HSG (2010), "The price of renewable energy policy risk: an empirical analysis based on choice experiments with international wind and solar energy investors", working paper, Institute for Economy and the Environment (IWÖ-HSG), University of St. Gallen, St. Gallen, Switzerland, March 2010.

Johnson, G., Scholes, K. and Whittington, R. (2005), *Exploring Corporate Strategy: Text and Cases*, 7th edition, Prentice Hall, London, UK.

Kahneman, D. (2003), "Maps of bounded rationality: psychology for behavioral economics", *American Economic Review*, Vol. 93 No. 5, pp. 1449-1475.

Kahneman, D. and Tversky, A. (1979), "Prospect theory: an analysis of decision under risk", *Econometrica*, Vol. 47 No. 2, pp. 263-291.

Knight, F.H. (1921), *Risk, Uncertainty and Profit*, Beard Books, Washington DC.

Koppenjan, J., Veeneman, W.W., Van der Voort, H., Ten Heuvelhof, E. and Leijten, M. (2010), "Competing management approaches in large engineering projects: The Dutch RandstadRail project", *International Journal of Project Management*, Vol. 29 No. 6, pp. 740-750.

Lim, G., Ahn, H. and Lee, H. (2005), "Formulating strategies for stakeholder management: a case based reasoning approach", *Expert Systems with Applications*, Vol. 28, pp. 831-40.

Lüdeke-Freund, F. and Loock, M. (2011), "Debt for brands: tracking down a bias in financing photovoltaic projects in Germany", *Journal of Cleaner Production*, Vol. 19 No. 12, pp. 1356-1364.

Lüthi, S. and Prässler, T. (2011), "Analyzing policy support instruments and regulatory risk factors for wind energy deployment: a developers' perspective", *Energy Policy*, Vol. 39 No. 9, pp. 4876-4892.

Lüthi, S. and Wüstenhagen, R. (2012), "The price of policy risk: Empirical insights from choice experiments with European photovoltaic project developers", *Energy Economics*, Vol. 34 No. 4, pp. 1001-1011.

McDaniel, B.A. (1983), "Economic and social foundations of solar energy", *Environmental Ethics*, Vol. 5 No. 2, pp. 155-168.

McElroy, B. and Mills, C. (2007), "Managing stakeholders", in Turner, J.R. (Ed.), *Gower Handbook of Project Management*, 4th edition, Gower Publishing, Aldershot, pp. 757-77.

Merrow, E.W. (2003), "Mega-field developments require special tactics, risk management", *Offshore*, Vol. 63 No. 6, pp. 90-92.

Mitchell, R.K., Bradley, R.A. and Wood, D.J. (1997), "Toward a theory of stakeholder identification and salience: defining the principle of who and what really counts", *Academy of Management Review*, Vol. 22 No. 4, pp. 853-885.

Mormann, F. (2012), "Enhancing the investor appeal of renewable energy", *Environmental Law*, Vol. 42, forthcoming.

Newcombe, R. (2003), "From client to project stakeholders: a stakeholder mapping approach", *Construction Management and Economics*, Vol. 21 No. 8, pp. 841-848.

Olsen, R.A. (2008), "Perceptions of financial risk: axioms and affect", *The Icfai University Journal of Behavioral Finance*, Vol. 5 No. 4, pp. 58-80.

Pasqualetti, M.J. (2011a), "The misdirected opposition to wind power", in Szarka, J., Cowell, R., Ellis, G., Strachan, P. and Warren, C. (Eds.), *Learning from wind power: governance, societal and policy perspectives on sustainable energy*, Palgrave Macmillan, UK, pp. 133-152.

Pasqualetti, M.J. (2011b): "Opposing wind energy landscapes: a search for common cause", *Annals of the Association of American Geographers*, Vol. 101 No. 4, pp. 907-917.

Pasqualetti, M.J. (2011c): "Social barriers to renewable energy landscapes", *Geographical Review*, Vol. 101 No. 2, pp. 201-223.

Perminova, O., Gustafsson, M. and Wikström, K. (2008), "Defining uncertainty in projects: a new perspective", *International Journal of Project Management*, Vol. 26 No. 1, pp. 73-79.

Prässler, T. and Schaechtele, J. (2012), "Comparison of the financial attractiveness among prospective offshore wind parks in selected European countries", *Energy Policy*, Vol. 45, pp. 86-101.

Raven, R.P.J.M., Heiskanen, E., Lovio, R., Hodson, M. and Brohmann, B. (2008), "The contribution of local experiments and negotiation processes to field-level learning in emerging (niche) technologies: meta-analysis of 27 new energy projects in Europe", *Bulletin of Science Technology Society,* Vol. 28 No.6, pp. 464-477.

Richter, M. (2009), Offshore-Windenergie in

Deutschland: Potenziale, Anforderungen und Hürden der Projektfinanzierung von Offshore-Windparks in der deutschen Nord- und Ostsee, Centre for Sustainability Management, Leuphana University of Lueneburg, Lüneburg, Germany, April 2009.

Rogers, E.M. (2003), *Diffusion of Innovations*, 5th edition, The Free Press, New York, NY.

Ruef, A. and Markard, J. (2010), "What happens after a hype? How changing expectations affected innovation activities in the case of stationary fuel cells", *Technology Analysis & Strategic Management*, Vol. 22 No. 3, pp. 317-338.

SAM (2012), personal communication, Sustainable Asset Management (SAM), St. Gallen, Zurich, Switzerland, June 2012.

Sanderson, J. (2012), "Risk, uncertainty and governance in megaprojects: a critical discussion of alternative explanations", *International Journal of Project Management*, Vol. 30 No. 4, pp. 432-443.

Shiller, R.J. (2003), "From efficient markets theory to behavioral finance", *Journal of Economic Perspectives*, Vol. 17 No. 1, pp. 83-104.

Simon, H.A. (1955), "A behavioral model of rational choice", *Quarterly Journal of Economics*, Vol. 69 No. 1, pp. 99-118.

Slovic, P. (1992), "Perceptions of risk: reflections on the psychometric paradigm", in Krimsky, S. and Goldin, D. (Eds), *Theories of Risk*, Praeger, Westport, CT, pp. 117-152.

Slovic, P., Finucane, M.L., Peters, E., MacGregor, D.G. (2004), "Risk as analysis and risk as feelings: some thoughts about affect, reason, risk, and rationality", *Risk Analysis*, Vol. 24 No. 2, pp. 311-322.

Sonntag-O'Brian, V. and Usher, E. (2004), "Mobilising Finance for Renewable Energies", Renewable Energy Policy Network for the 21st Century (REN21), available at: http://www.renewables-bonn-2004.de/pdf/tbp/TBP05-financing.pdf (accessed 27 November 2012).

Stohlmeyer, H. and Küver, S. (2002), "Finanzierung von Offshore-Windenergieprojekten", in Övermöhle Consult & Marketing GmbH and Ingenieurbüro elexyr (Eds.), *Fascination offshore – report 2002*, Hamburg, pp. 146-149.

Thayer, R.L. (1988), "The aesthetics of wind energy in the United States: case studies in public perception", proceedings of the European Community Wind Energy Conference in Herning, Denmark, 1988, Herning, pp. 470-476.

Todd, P.M. and Gigerenzer, G. (2003), "Bounding rationality to the world", *Journal of Economic Psychology*, Vol. 24 No. 2, pp. 143-165.

Toke, D., Breukers, S. and Wolsink, M. (2008), "Wind power deployment outcomes: how can we account for the differences?", *Renewable and Sustainable Energy Reviews*, Vol. 12 No. 4, pp. 1129-1147.

UNEP (2012), "Global Trends in Sustainable Energy Investment 2012", Frankfurt School UNEP (United Nations Environment Programme) Collaborating Centre for Climate & Sustainable Energy Finance, available at: http://fs-unep-centre.org/sites/default/files/publications/globaltrendsreport2012final.pdf (accessed 27 November 2012).

van Marrewijk, A., Clegg, S.R., Pitsis, T.S. and Veenswijk, M. (2008), "Managing public-private megaprojects: paradoxes, complexity, and project design", *International Journal of Project Management*, Vol. 26 No. 6, pp. 591-600.

Wang, M., Keller, C. and Siegrist, M. (2011), "The less you know, the more you are afraid of – a survey on risk perceptions of investment products", *Journal of Behavioral Finance*, Vol. 12 No. 1, pp. 9-19.

Wang, X.T. and Johnston, V.S. (1995), "Perceived social context and risk preference: a re-examination of framing effects in a life-death decision problem", *Journal of Behavioral Decision Making*, Vol. 8 No. 4, pp. 279-293.

Wang, X.T., Simons, F. and Brédart, S. (2001), "Social cues and verbal framing in risky choice", *Journal of Behavioral Decision Making,* Vol. 14 No. 1, pp. 1-15.

Wolsink, M. (1987), "Wind power for the electricity supply of houses", *Netherlands Journal of Housing and Environmental Research*, Vol. 2 No. 3, pp. 195-214.

Wolsink, M. (1988), "The social impact of a large wind turbine", *Environmental Impact Assessment Review*, Vol. 32 No. 8, pp. 324-325.

Wolsink, M. (1989), "Attitudes and expectancies about wind turbines and wind farms", *Wind Engineering*, Vol. 13 No. 4, pp. 196-206.

Wolsink, M. (2007a), "Planning of renewables schemes: deliberative and fair decision-making on landscape issues instead of reproachful accusations of non-cooperation", *Energy Policy*, Vol. 35 No. 5, 2692-2704.

Wolsink, M. (2007b), "Wind power implementation: the nature of public attitudes: equity and fairness instead of 'backyard motives'", *Renewable and Sustainable Energy Reviews*, Vol. 11 No. 6, pp. 1188-1207.

Wüstenhagen, R. and Menichetti, E. (2012), "Strategic choices for renewable energy investment: conceptual framework and opportunities for further research", *Energy Policy*, Vol. 40, pp. 1-10.

Wüstenhagen, R., Wolsink, M. and Bürer, M.J. (2007), "Social acceptance of renewable energy innovation: an introduction to the concept", *Energy Policy*, Vol. 35 No. 5, pp. 2683-2691.

Wüstenhagen, R., Wuebker, R., Bürer, M.J. and Goddard, D. (2009), "Financing fuel cell market development: exploring the role of expectation dynamics in venture capital investment", in Pogutz, S., Russo, A. and Migliavacca, P. (Eds), *Innovation, Markets, and Sustainable Energy: The Challenge of Hydrogen and Fuel Cells*, Edward Elgar, Cheltenham, UK, pp. 118-137.

Yescombe, E.R. (2002), *Principles of project finance*, Academic Press, San Diego/London.