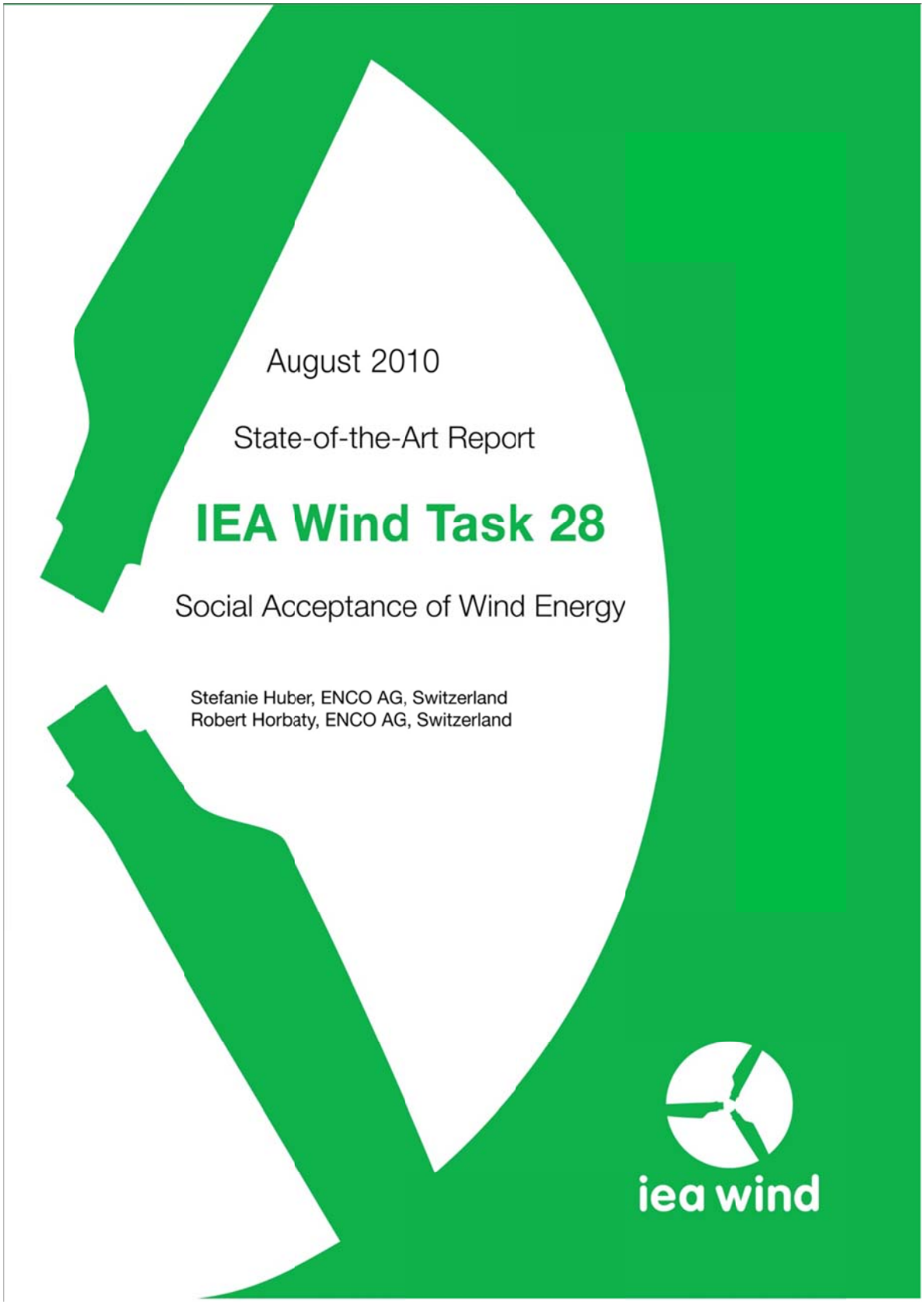
August 2010
State-of-the-Art Report
IEA Wind Task 28
Social Acceptance of Wind Energy
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iea wind

Technical Report

Results of IEA Wind Task 28 on Social Acceptance of Wind Energy

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Preface

Purpose and Goal of the Report

This State-of-the-Art Report attempts to compile current knowledge about social acceptance of wind energy projects. It answers the questions: What do we know and what do we need to know? Ongoing research with available results as well as information about documented projects and educational material are included with the aim of identifying key success factors and defining further research questions. The approach is cross-country and interdisciplinary. The language should be comprehensible to various stakeholder groups, such as developers, authorities, environmental organizations, and the general population. Results and findings are based on a collection of studies and the experience of the participating countries. Individual reports following the same structure as this State-of-the-Art Report and highlighting the specific country experiences are available at **www.socialacceptance.ch**.

IEA Wind Task 28

Task 28 is an international working group of the International Energy Agency Implementing Agreement for Co-operation in the Research, Development, and Deployment of Wind Energy Systems (IEA Wind). The task was founded in 2008 and will continue its work through 2011. Ten countries are participating (see Table 0-1). Experience from additional countries such as Australia, Spain, and the United Kingdom is included through the referenced literature. Operating Agent Robert Horbaty from Switzerland is coordinating the work. More information on IEA Wind Task 28 can be found on **www.socialacceptance.ch**.

Table 0-1: IEA Wind Task 28 Participants, 2008 to 2010

Country	Contracting Party	Active Organizations
Canada	Natural Resources Canada, CANMET Energy Technology Centre	University of Québec at Montréal
Denmark	Danish Energy Agency	
Finland	Finnish Funding Agency for Technology and Innovation, Energy and Environment Industries / TEKES	Wpd Finland, Motiva Oy
Germany	Federal Ministry for the Environment, Nature Conservation and Nuclear Safety	Martin-Luther-University, Otto-von-Guericke-University
Ireland	Sustainable Energy Authority Ireland	
Japan	National Institute of Advanced Industrial Science and Technology	Nagoya University, University of Tokyo
The Netherlands	Agentschap NL, Energy and Climate	Agentschap NL, Energy and Climate
Norway	Norges vassdrags-og energidirektorat; Enova SF	Centre for Energy and Society at NTNU
Switzerland	Federal Department of the Environment, Transport, Energy and Communications, Swiss Federal Office of Energy; Wind department	ENCO AG (Operating Agent)
United States	U.S. Department of Energy	National Renewable Energy Laboratory

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Abstract

How do you turn affected people into involved parties to get public support? Successful approaches such as community ownership or participatory planning and decision making processes have been seen in different countries. Knowledge on how to engage with the public to improve the wind energy planning process is available, but has to be advanced into a best practice and disseminated. The translation of social science outcomes into the language of planners and developers has to be enforced.

This paper of the IEA Wind Task 28 on Social Acceptance of Wind Energy Projects presents an overview on current research and ongoing activities.

Executive Summary

Surveys show that the public often strongly supports wind energy. Governments and political leaders have acted on this sentiment by establishing renewable energy quotas and providing incentives to encourage development. However, individual wind energy projects sometimes meet fierce opposition from residents in the communities where a project has been proposed or built. Such local or community resistance introduces risk, increases costs, and extends the project development period. It may also halt otherwise viable projects. Proposed projects can even be impacted by opposition from outspoken individuals or small groups of individuals whose positions and opinions are amplified by various media. As ambitious renewable energy or carbon emission goals are generally expected to require continued deployment of wind energy technology, resolving social acceptance barriers is an integral step in achieving these goals.

This report is a first-of-its-kind snapshot of current international knowledge on social acceptance of wind energy. The focus of the report is primarily on large utility-scale wind energy projects, but as new transmission is often required to move wind power to load centers, it includes a brief discussion of social acceptance of associated new high-voltage transmission lines. The report emphasizes issues that are common across political, cultural, and national boundaries and highlights what is known along with mechanisms, strategies, and development models that have successfully resolved social acceptance challenges in the past.

The report is intended for policymakers, wind project host communities, project developers, and other interested stakeholders and is composed by Task 28 of the International Energy Agency Implementing Agreement for Cooperation in the Research, Development, and Deployment of Wind Systems (IEA Wind). Country-specific contributions from participants in Task 28 represent the primary content from which this report was compiled. Specific contributions are best represented by the nine individual country reports available on the Task 28 Web site (www.socialacceptance.ch). Primary contributions include perspectives from Europe, North America, and East Asia. Experiences and knowledge gained in countries not participating in Task 28 have been included to the extent they are reflected in the relevant literature.

Summary of conclusions

The findings of this state-of-the-art report suggest that siting wind energy projects presents a number of challenges uncommon to larger, more centralized conventional energy generation sources. Wind energy introduces a moving element into large areas within rural landscapes. Host communities in particular often feel that they bear a disproportionate share of the negative impacts associated with wind energy projects.

In general, host community concerns are centered on potential changes in quality of life and well-being. More specifically, community concerns include visual or landscape impacts, nuisance (e.g., noise or shadow flicker) impacts, and fear of property value loss. Local residents also frequently feel they have little influence or control in whether a wind project is sited in their community or how a proposed project might be designed.

Other social acceptance challenges persist as a result of potential wildlife and ecosystem impacts, as well as issues of cost or industry viability in the absence of government support. Social acceptance challenges may be complicated by uncoordinated or poorly designed and implemented land use plans or permitting and regulatory policy that does not adequately address public concerns.

This effort also identified an array of strategies to resolve social acceptance challenges, including:

- Engage and seek public consultation early: Wind energy projects have both positive and negative impacts. Discussing all project attributes assists in addressing both local community and developer needs. By reducing the risk for future surprises, early and transparent communication can even strengthen projects and assist in building public support. Such efforts may necessitate increased sensitivity to the geographic and cultural characteristics of a particular region. Public consultation on projects cannot begin too soon.
- Employ participatory development and investment models: Mechanisms that directly engage local residents in the development and operational phase of a project have been noted to decrease opposition to projects. Allowing individual investment by local residents is an easily recognized form of participation that reallocates project costs and benefits and often empowers host communities.
- Implement coordinated and efficient processes: Ensuring that permitting and regulatory processes are coordinated, clear, purposefully designed, and transparent can reduce unnecessary development hurdles while better communicating to the public what to expect from wind energy projects.
- Continue refining and communicating state-of-the-art knowledge: Development of technical knowledge with respect to project impacts and how impacts change over time is critical to the continued refinement of industry best practices. Clearly communicating the knowledge of technical experts, environmental scientists, and social scientists will allow for increasingly informed decisions by communities, policymakers, and project developers.

While these strategies can often ameliorate opposition to wind energy projects, it must also be recognized that individual reactions are highly subjective and it is unlikely that 100% public support will be achieved for any individual project. Nevertheless, continuing to push industry best practices and winning as many hearts and minds as possible remains critical in the information age because the history of any individual project has the potential to influence public perceptions of many subsequent projects.

Outlook

Task 28 will continue its work in 2011 with the following focus topics based on the results of this report:

- Elaboration of recommendations ("Good Practices") for all parties involved in or impacted by wind energy planning. Results from the various fields and practical experience from the different countries shall be gathered in the form of guidelines for how to deal with wind energy opposition and how to take into account project-specific aspects of wind energy projects with the objective of improving the projects to everybody's benefit and to make the projects acceptable to a majority.
- Dissemination of knowledge gained in the work of Task 28 and strengthening of the expert network. Information on Task 28 activities and various other projects and research is available on our home page www.socialacceptance.ch. You can contact us by using the contact form.

1. Background Information and Task Objectives

The social impacts of wind energy development have received considerable attention from the media, governmental or regulative discussions, and in academic research. The following chapter describes wind energy social acceptance[1] issues and frames the report, including the methodology and a description of IEA Wind Task 28.

1.1 The issue: social acceptance of wind energy projects

Ambitious energy policy often includes targets for slowing climate change, improving air quality, or increasing energy security. Each of these goals may benefit from rapid deployment of renewable energies. Many governments have developed incentive programs to encourage a rapid increase in renewable energy production, but the growth of wind energy varies among countries and regions.

Reports on heated debates and strong opposition to wind energy projects have drawn attention to social barriers to renewable energy production (Der Spiegel 2004; The Economist 2010). While public opinion polls usually show that large majorities support renewable energies – including wind energy – and environmental organizations frequently support them as well, many projects meet with resistance from local communities or from environmental organizations. The importance of the issue has also been recognized by the wind industry (EWEA 2009), and topics such as consultation have found their way into industry's best practices[2].

Figure 1-1: Positive images of wind energy[3]

[1] For a definition of the term "social acceptance," see Section 2.1.
[2] See Section 8.3.
[3] From various web sites

Research on social acceptance of renewable energy technologies has been completed in many countries from most continents. Recent projects covering wind energy and cross-country analyses include:

- IEA Wind Topical Expert Meeting in 2004 (Hammarlund et al. 2004)
- "Create acceptance" (Create Acceptance 2008)
- "Study on organizational models and best practice for facilitating local co-ownership and similar ways of increasing community acceptance of renewable energy projects"4 (Directorate-General Energy and Transport 2009)
- Project "RENBAR: Good practices for solving environmental, administrative, and social barriers in the deployment of renewable energy systems" (De Jager 2010).

Experience and best practices from developing other energy production technologies such as nuclear, hydro, or biomass or from infrastructure projects such as waste facilities, traffic projects, or airports may be relevant to social acceptance of wind as well.

Wind energy projects feature characteristics (some of them shared with other renewable energy technologies) that influence acceptance of this technology compared to conventional power generation:

- A single renewable energy plant tends to be smaller than a conventional power plant, a circumstance that increases the number of necessary siting decisions (Wüstenhagen et al. 2007).
- Renewable energy technologies tend to be characterized by lower energy densities, which render the higher relative visual impact (per megawatt-hour of output) (Wüstenhagen et al. 2007).
- Conventional power production has received many incentives for decades in terms of development support, allowed externalities, etc. As a result, renewable energy projects do not compete on a level playing field with incumbent technologies; short-term costs compete with long-term benefits (Wüstenhagen et al. 2007).
- Renewable energy production may occur closer to where the energy consumers live due to the availability of resources (Pasqualetti 2000; Wüstenhagen et al. 2007).
- The movement of the blades attracts the human eye and renders turbines a strong visual centre in the landscape (Pedersen 2007). Additionally, wind turbines in today's design add a technical element to the landscape that does not suit a traditional perception of landscapes (Brittan 2001), while untouched landscapes and open spaces are becoming more rare (Feurtey et al. 2008). Landscape is a complex term and is experienced individually with varying connotations to identity, history, etc., making objective criteria difficult to define (Ott et al. 2008).

[4] The invitation to tender went up to October 2009, the results have not been published in August 2010.

- One of the main drivers for wind energy deployment is climate change which also implies that wind energy's benefits accrue on a national or international scale. However, local communities have to act and also have to bear the external costs such as the landscape change (Baba et al. 2004).
- Modern conventional (centralized) energy production has decreased public awareness of energy production and its external costs. People therefore have to get used to accepting external costs of energy production in their "backyard", even if renewable energy technologies are generally perceived as "clean" (Pasqualetti 2000).

The following list summarizes some of the most important wind energy issues based on discussions around wind energy and literature from various countries that will be presented in this report:

- **Policy and spatial planning:** the influence on social acceptance of renewable energy targets, energy concepts, siting criteria, financial support, and other elements of energy policy and spatial planning
- **Quality of life/well-being:** concerns over health, annoyance, and stress related to noise, low-frequency sound, shadow flicker, or obstruction markings
- **Standard of living and property values:** "myths" about rising electricity prices and concerns over negative impacts on real estate values resulting from wind energy projects
- **Landscape:** the issue of landscape as part of the identity of the people whose families have been living in the specific area for centuries, or landscape with their quietness and natural beauty as the reason why people moved out from the cities to the rural areas
- **Ecosystems:** fear of potential negative impacts of wind projects or the accompanying infrastructure on the local ecosystem (forests, birds, and bats)
- **Transmission lines:** objections to transmission lines and other infrastructure often needed for wind power deployment
- **Distribution of costs and benefits and procedural questions:** How can the people who bear the disadvantages of wind energy projects benefit from the advantages? How can they be integrated in the planning and decision processes?

Figure 1-2: Negative images of wind energy[5]

1.2 IEA Wind Task 28

The IEA Wind Task 28 working group discusses ongoing projects, research outcomes, and upcoming issues and engages in reciprocal learning. The participating members provide different backgrounds and stakeholder views to facilitate a better understanding of the issues. Their work also includes translating the existing knowledge of social scientists, including tools and guidelines, into the language of policy-makers, planners and engineers. Topics include wind energy implementation strategies and policies, social impacts of wind energy projects, understanding and involvement of stakeholder groups, distributional justice, and procedural design.

The participants wish to facilitate the development of wind energy in the concerned countries. This includes reducing project risks and preventing misunderstandings between actors as well as specific objectives such as:

- Establishing an international forum for exchange of knowledge and experiences related to social acceptance and other societal issues
- Collecting and processing the current social acceptance knowledge of wind energy in the form of a state-of-the-art report and a best practice report. Dissemination will occur through the reports, participation at conferences, and an online library
- Describing successful participation models
- Establishing strategies and communication activities to improve or to maintain wind energy's image.

[5] From various web sites

1.3 Methodology

During several meetings, the Task 28 working group outlined relevant aspects of social acceptance and topics of current wind farm deployment discussions. The working group members shared the expertise of their specific disciplines and the situations in their countries. The aim was to provide a complete picture of today's knowledge on social acceptance of wind energy. The lead questions were:

- What do we know about social acceptance?
- What do we need to know?
- Which areas require more research or implementation effort?

The structure of the report evolved over time, incorporating new aspects from members as the work progressed. Many sections are strongly interlinked. For example, the landscape plays an important role for several stakeholder groups, but it is also discussed as part of the well-being of people living near wind farms, and it is an important topic in procedural questions about how landscape concerns are addressed. Therefore, the sections should be viewed as focus points, while the issues and respective information are included as needed throughout the report. The references given in the specific sections are not concluding but rather exemplary.

The participating countries provided an overview of the issues being discussed in the individual countries together with projects and research (completed and ongoing). They provided the framing conditions such as regulations and the general contextual background on energy provision. The inputs of the participating countries are documented in the form of "country reports" which are structured similarly to this report and will be published in parallel with this report. This State-of-the-Art Report largely represents the compilation of the individual country reports. However, participants also added information from their own specific research areas concerning projects and research from non-participating countries. The intended audience for this work is the general public and especially the wind community. The development and compilation of the country inputs took place from autumn 2009 to spring 2010. The work was partially updated and completed with publications issued in spring and summer 2010.

The ability to generalize the statements in this report is restricted because the resource studies mostly originate from highly industrialized countries such as Australia, Canada, Europe, Japan and the United States. Individual references were included from countries such as China, Mexico, and South Africa.

The structure of the report is as follows:

Part I: Framing the Issue, presents the setting of the report and clarifies some of the terms used:

- Definitions: Which concepts do we have to understand social acceptance? What types of projects are discussed (onshore or offshore, scale of projects, scale of turbines, infrastructure)?

Part II: Industry Status and Stakeholders, frames the industry as it exists in the participating countries and highlights the perspectives of groups and organizations impacted by wind energy projects:

- Wind energy policy and spatial planning: How do energy policies impact social acceptance issues and how do national concepts get implemented by the regional authorities and the local communities? What is the role of spatial planning in the process of generating acceptance?
- Stakeholders: Who are the opinion makers? What is the perspective of the various organizations, institutions, educators, tourists, and the local population? How do they influence institutional and market acceptance?

Part III: Variables Influencing Social Acceptance, covers various aspects in the planning and implementation of projects:

- Well-being: Addressing and communicating negative and positive impacts of wind energy on people, valuation of ecosystems
- Distributional justice: Wind energy costs, perceived transfers of wealth, respective burden sharing, impact on the local economy, possible ownership models, and financial participation opportunities
- Procedural design: Participation, public consultation, respect of cultural relationship, and local context
- Implementation strategies: Communication, guidelines, practical application of scientific results

Part IV: Summary and Conclusions, includes a summary of the cross-country commonalities and differences as well as conclusions on what we know about social acceptance, areas requiring further work, and future plans.

Part I: Framing the Issue

2. Definitions

The following sections provide background information about the content of this report by discussing the definition of the term "social acceptance" as used in the studies. The chapter also provides information about the types of projects the report will focus on (onshore or offshore, scale of turbines and scale of projects) and describes the inclusion of transmission in the considerations.

2.1 Social acceptance

We can find several approaches to define and understand social acceptance in the social science literature. The primary reference for IEA Wind Task 28 and other organizations such as the European Wind Energy Association (EWEA 2009) is the three-dimensional concept elaborated by Wüstenhagen et al. (2007). See also Figure 4-1. Socio-political acceptance is the most general dimension of acceptance and refers to the attitude of the public, key stakeholders, and policy-makers. Community acceptance relates to acceptance by local stakeholders – local authorities and residents – of particular siting decisions and renewable energy projects. Often, concerns of procedural and distributional justice as well as questions of trust arise at this level. Finally, market acceptance involves both consumers and investors and refers to the process of how the market adopts and deals with innovations.

Figure 2-1: The triangle of social acceptance of renewable energy innovation (Wüstenhagen et al. 2007)

A different concept focuses on the notion of a social contract to analyze social acceptance. A social contract provides for institutional and behavioral rules and mirrors a common understanding between electric utilities and the society. Electric utilities, for example, are committed to guarantee security of supply or public service. In return, they enjoy a

> "carefully defined freedom of action. This can take the form of legal or quasi-legal monopoly of rights … Governments can favor one energy source at the expense of another …" (Haugland et al. 1998).

The form and content of social contracts change over time and within national contexts. Szarka (2007) points out that social contracts in the energy sector were challenged by market liberalization in the 1980s and 1990s, which led to changes in industry structures and behavior, but also by technological and political developments. He concludes:

> "Wind power is displaying a capacity to disrupt social and industrial norms to a significant extent. It may even be in the process of rewriting the social contract related to

> electricity. Inevitably, this has raised the question of the acceptability of wind power, in different locations, at different scales of deployment and for different reasons."

The Create Acceptance Project (2008) assessed the optimal conditions (i.e., determinants of success and failure) for the implementation of renewable energy technologies in terms of socio-economic aspects, consumer preferences, and citizen needs. To analyze the historical and recent acceptance of new energy technologies in different regions in Europe and South Africa, the project's social science approach defines societal acceptance as existing when:

- There is support for the technology among the expert community and national and local policy-makers.
- The general public has an informed and largely positive view of the technology.
- Concrete applications do not meet significant obstacles from local policy-makers, residents, the NGO community, or other representatives of social interests.
- Ordinary people are willing and prepared to adopt the applications in their own contexts and to support them with positive actions.

A definition of social acceptance of renewable energy technologies from a psychological point of view has been presented by Schweizer-Ries et al. (2008), based on (Dethloff 2004). Their approach, "Evaluation and action", describes the diffusion of innovations in the renewable energy sector by an evaluation and an action dimension. The state of acceptance of a respective interest group was described by active support (positive evaluation and active behavior), rather passive approval (positive evaluation but no action), rather passive rejection (negative evaluation but no action) or active opposition (negative evaluation and active behavior). Results from field studies indicate a high level of approval in principle but less active support for wind energy projects.

Social acceptance of wind energy has significant implications on the sustainability of a technology or a specific project such as defined in the three-pillar concept (Outhred et al. 2002; Beauchemin et al. 2004; auswind 2006; Welch and Venekateswaran 2009; Gallego Carrera and Mack 2010). To be called sustainable in this context, wind energy development has to occur in a socially acceptable manner (Kolonas 2007). But as there is a certain trade-off between global gains and local bearing of the external costs, the question has been raised how environmental and social sustainability can be reached together (Dobson 1998).

2.2. Onshore / offshore

Onshore wind technology is already well developed and much experience has been gathered. Offshore wind on the other hand has just started to gain momentum – social acceptance is therefore discussed differently as people have already acquired more experience for onshore wind energy. The report will include information on both types whereby usually onshore is meant where not specified differently. For a discussion of the variance in acceptance concerning onshore and offshore wind energy, see Section 4.2.1.

2.3. Scale of wind energy projects

Wind energy scale has two dimensions. First, there is the scale of the turbines – from a few hundreds of kW capacity to multi-megawatt turbines; second, there is the scale of the projects – from one single turbine to hundreds of turbines. During the past decades, the scale of the turbines and the scale of the projects have increased. Small turbines and single turbine projects persist, but this report focuses on larger turbines and projects as these industrial developments tend to raise the most opposition.

There is no generally accepted definition as to the rated capacity (in kW) that separates large and small turbines. Concerning projects, small wind farms usually consist of a dozen turbines or fewer (Ek 2002; Failte Ireland 2008; Whitford et al. 2008; Barry and Chapman 2009).

For a discussion of the variance in acceptance concerning the scale of wind energy, see Section 4.2.1.

2.4. Transmission lines

The best wind resources and open landscape to build the wind farms are often found far from the load centers of cities and industrial sites. Continued wind energy deployment is expected to require transmission lines, crossing over state and sometimes even country borders (Lantz (ed.) and Flowers (ed.) 2010; McCarthy 2010). Wind farm projects and transmission line projects also share some parallelisms concerning acceptance, e.g. for visibility or planning processes. Due to the linkages mentioned, transmission line projects will be discussed in this report as well.

For a discussion of acceptance issues around transmission, see Section 4.2.1.

In connection with transmission and grid issues, there often is a reference to smart grids: Decentralization of the grid and the introduction of bilateral flows of electricity pose a challenge to today's structures. Renewable energy technologies could be used as drivers for smart grids (DiBlasio-Brochard et al. 2010).

Part II: Industry Status and Stakeholders

3. Wind Energy Policy and Spatial Planning

The following chapter provides background on policy and spatial planning issues that have a direct or indirect connection with social acceptance issues. This includes topics such as energy policy and renewable energy targets, wind energy concepts and planning, and policy instruments for financial support and the influence of these topics on the ownership structures and certainty for investors.

3.1 Policies and strategies for wind energy

A wide variation in national policies, strategies, and approaches to renewable energy and wind energy specifically has been found in the participating countries of IEA Wind Task 28 as well as in some other countries where literature provided insights on the topic. Table 3-1 provides an overview on policies and strategies in connection with comments on the general situation of wind energy and social acceptance discussions in the respective country. We refer to the country reports and other references mentioned for a more complete discussion of the national policies and strategies.

Table 3-1: Overview of national situations concerning wind development, strategies, and topics

Country	General Situation	Policy/Strategy	Comments
Europe			
Denmark (Nielsen 2010)	Wind development since 1970s; strong public and private involvement, reduced by development of large and offshore wind farms	A visionary Danish energy policy 2025; Energy Policy Agreement (2008); Wind Turbine Secretariat	Ambitious goals; new incentives for compensation, involvement, and participation
Finland (Koskinen and Laitinen 2010)	First wind farm erected in 1990; slow wind development since	The Finnish government has chosen wind power as one key to achieving national climate and energy strategy targets; a feed-in tariff is in preparation, so far there is investment support for large-scale wind power and partial tax reduction for small-scale wind power	Very small industry

Country	General Situation	Policy/Strategy	Comments
Europe			
France (Jobert et al. 2007; Nadai 2007; Szarka 2007)	Nuclear background renders discussion on wind different from other countries (no requirement to decarbonize electricity sector, wind is less easily accommodated with a system dominated by nuclear power generators)	Feed-in tariff introduced; new policy scheme with a new way of dealing with centralization and planning/siting issues	Additional hindrance through complex planning procedures; first feed-in tariff triggered regional concentration in locations with best wind resources
Germany (Hübner et al. 2010)	Strong growth in past years	Ambitious targets and several policies/strategies for implementation, e.g. feed-in tariff	Repowering and offshore are important issues; different research and implementation efforts in connection with social acceptance of wind energy projects are needed
Greece (Kaldellis 2005; Dimitropoulos and Kontoleon 2009; Oikonomou et al. 2009)	High wind energy potential; much dependence on foreign fossil fuel resources; poor electricity provision, especially on islands	Legislation in place since 1980s; includes feed-in tariffs, grid connection, subsidies, tax breaks, exemptions	Grid network is poor, especially on islands and to mainland; complex bureaucracy; local concentration and some poorly maintained wind farms
Ireland (McCarthy 2010)	One of Europe's largest wind resources, will contribute greatest share to renewable energy targets; grid development is required; one of the few states expected to achieve renewable energy targets in 2010	Very ambitious targets for future, seen as minimum rather than ceiling; 2007 Energy White Paper Ireland; rounds of connection offers (Gates)	Grid development and transmission lines are the key issue in Ireland, rather than social acceptance of wind turbines, but planning consent concerns are growing
Norway (Solli 2010)	Almost 96% hydro power, some thermal power stations, increasing wind production; increasing power demand in increasing power market; offshore wind projects planned	Until recently, prioritization of large-scale onshore at locations with optimal wind resources; new juridical regulation planned	Realization of onshore wind projects quite modest, potential dependent on how issues of social acceptance handled as well as investments and development of grid capacity

Country	General Situation	Policy/Strategy	Comments
Europe			
Spain (Meyer 2007; PROGRESS 2008; Zografos and Martínez-Alier 2009)	First grid-connected farm in 1984, slow progress until 1995, different support schemes over the years	Since 2004, increasingly market oriented; public-private partnerships	Differing regulations among regional governments; formation of powerful interest groups around the sector
Sweden (Khan 2003; Meyer 2007)	Own development for turbines from 1970s on; responsibility for wind expansion given to utilities in 1980s, promotion then divided among several institutions until 2005; varying support mechanisms	Investment subsidies since the 1990s; new support scheme in 2003 based on trading of green certificates, modified in 2006	No strong policy measures and therefore large differences in local treatment of wind energy deployment; negotiations with Norway on common certificate market
Switzerland (Geissmann 2010)	Wind resource not great compared to other renewable energies; hydro and nuclear are dominant	2004 wind energy concept; several guidelines for planners and developers; new recommendations (2010) Feed-in tariff since 2009	Social acceptance issues, especially landscape, are important as Switzerland is geographically structured at a small scale; no consistent approach among states
UK (Jones and Eiser 2009)	Renewables only contributed 4% to the electricity generation in 2007 (fossil fuels and nuclear)	Progressive targets, several acts (white paper 2007, climate change act 2008, energy act 2008); incentives	
North America			
Canada (DiBlasio-Brochard et al. 2010)	Federal structure leads to initiatives for promotion of renewables on federal and provincial scale	Even if quick and successful implementation, national concepts are difficult to identify	Most provinces have policies; targets and means vary considerably

Country	General Situation	Policy/Strategy	Comments
North America			
United States (Meyer and Steinbiss 2008; Lantz (ed.) and Flowers (ed.) 2010)	State Renewable Portfolio Standards have led the way; recent extension in federal tax and financial policy support have supported strong growth; interstate transmission development is a primary barrier	In the absence of consistent, comprehensive, long-term national energy strategy, policy developing at the state level in the form of renewable energy standards has stimulated growth. Fluctuating gas prices, uncertain policy, and increasing utility acceptance have aided wind markets	In the past, many utilities resisted wind energy. But rapid industry growth into more populated regions and the need for significant new transmission capacity have highlighted social acceptance as an important barrier
Other Continents			
China (Han et al. 2009)	Rich wind resources; wind development has only started compared to potential in China	Some renewable legislation in place, including targets; renewable energy planning included in 5-year plans	Development shortcomings compared to western countries; social issues still low on agenda, but future conflicts foreseeable
Japan (Maruyama et al. 2007; Maruyama et al. 2008; Maruyama 2010)	Wind ranges behind biomass; photovoltaic and water power produce each about one-quarter of wind production	Act on Special Measures for the Promotion of New Energy Use; Renewable Portfolio Standard Law; Subsidized projects for R&D and promotion of wind power generation	Wind power historically in politics lower ranked than photovoltaic power; “Tradable Green Certificate System”; additional requirements (e.g., earthquake safety)
New Zealand (Barry and Chapman 2009; Graham et al. 2009; Krumdieck 2009)	One of world’s best resources, dependent on tourism and agriculture; special situation as an island	Electricity market under constant changes since 1990s; not much government intervention; no consistent support policy	Possibility for people to send in a submission and take projects to court; concentration on few sites so far, mostly large wind farms to make them profitable

From this overview, some energy policy characteristics with respect to the underlying geographical, historical or political factors with a direct or indirect influence on social acceptance can be summarized:

- **Electricity generation mix:** Countries where the electricity generation relies heavily on fossil fuels have to decarbonize the electricity sector as fast as possible. France with its nuclear and Switzerland with its hydro/nuclear electricity generation mix don't experience the same pressure to develop renewable energy sources such as wind. While in these countries, the contribution of wind energy often has not reached a relevant size compared to other electricity production technologies, yet other countries such as Germany are already tackling the replacement of older wind farms with newer and often larger turbines ("repowering").
- **Balancing power for variable resources:** While Ireland has little potential to produce a relevant amount of electricity from hydro power plants and has to balance wind energy with gas or increased interconnection, countries in northern Europe or alpine countries may relatively more easily combine variable output electricity sources such as wind with hydro power.
- **Geographic concentration of wind farms:** Regional concentration with subsequent acceptance problems has been experienced by several countries such as France, Greece, and New Zealand.
- **Early starters and latecomers:** While some countries such as Denmark or Germany invested early in wind energy development and deployment and have acquired experience so as to export their products, other countries such as the UK or Canada struggle to achieve additional benefits of job creation, export opportunities, etc.
- **Federal versus unitary states:** In countries such as Canada, Germany, Switzerland, or the United States, the sub-national units may shape their own renewable energy policies (which can differ greatly). This is more difficult in states such as France. However, it is easier to introduce consistent approaches with a more centralized government structure.
- **Market liberalization:** The liberalization of the electricity market has influenced renewable energy development in several cases and has sometimes added to regulation uncertainty (Cowell and Strachan 2007).
- **Policy targets:** Setting policy targets for the intended amount of wind energy capacity and wind energy production often requires several adjustments of the respective legislation and support schemes.
- **Policy instruments:** A wide variety of policy instruments is used, for example, to stimulate investment in renewable energy technologies (feed-in tariff, investment support, tax credits etc.). The type of policy instruments has also influenced ownership structure and industry development. Citizen ownership for example is usually less viable for large wind farms which require substantial upfront capital investments. For an analysis and comparison of policy instruments in several European countries, see (Szarka 2007).

3.2. Wind energy incentive programs

Most countries have some sort of incentive for renewable energy or wind energy, including[6]:

- Feed-in tariff (Denmark, France (Nadai 2007), Germany, Ireland, Ontario, Canada; freshly introduced in Switzerland, under development in Finland)
- Investment support (Canada, Finland, Norway, United States)
- Tax credits/abatements (states and federal government in United States, partially Finland, partially Ireland)
- Renewable energy portfolio standards (states in United States, UK (Szarka 2007))
- Grants for research and development (Denmark, Japan, United States)
- Green Certificate System (Japan).

While some countries still lack a national strategy and respective incentive programs or have just started, Denmark and Germany have already tackled major revisions of their feed-in tariff system, adapting the system to market conditions. In Germany, the latest amendments enabled monthly changes between feed-in tariff and the market as well as measures to better integrate wind into the whole electricity system (BWE 2009). In Denmark, new legislation brought an improvement of the feed-in tariff and also introduced various measures such as the compensation of property value loss, a local option for share purchase, financial support for preliminary investigations, subsidies for a green scheme and the institution of the Wind Turbine Secretariat as a support for the communities (Nielsen 2010).

Support for small-scale wind seems to be low on most countries' agendas. There are some indirect incentives; e.g., the requirement of a certain amount of renewable energy generation for new buildings. In New Zealand, discussions for a support scheme are ongoing (Barry and Chapman 2009). The subsidies in Greece have been described as rather unsatisfying (Oikonomou et al. 2009). However, small-scale turbines seem to be limited to niche markets and — more important — quality standards are lacking (Hübner et al. 2010). The Canadian province of Quebec launched a call for tenders for 500 MW, which is addressed exclusively to small community projects up to 25 MW and First Nation wind farm projects (Audet 2009).

3.3. Spatial planning

Spatial planning in this section refers to questions of planning processes, obtaining permits and licenses, and siting. It does not include strategies for how to get support and acceptance as a project proponent. For a discussion of implementation and communication strategies, see Chapter 7.

The following section presents some of the main aspects of spatial planning that are discussed in the context of social acceptance, including an overview on guidelines for planning procedures available from the national to the local level for the participating countries (Table 3-2).

[6] Where no other reference is mentioned, see the respective country reports.

A clear declaration by the national, regional, or local authorities where wind is desired helps planners and authorities to found their decisions. It also helps developers and investors to minimize their risks. Some examples include the wind energy concept and state planning schemes including wind maps in Switzerland (Geissmann 2010), the German project "Strategies for sustainable land use in the context of wind power generation" (Ohl et al. 2007), 5-year strategic development plans by Irish counties (McCarthy 2010); and the Finnish wind atlas (Koskinen and Laitinen 2010). Incentives in some countries have led to regional concentration as only locations with the best wind resources could be profitably harvested. This was the case e.g. in New Zealand (Graham et al. 2009), France (Nadai and Labussière 2009), and Greece (Kaldellis 2005).

Complex and time consuming planning and application processes, sometimes including several different licenses and approvals, on national, regional and / or local scale have been criticized in several countries, e.g., in Finland (Koskinen and Laitinen 2010), Sweden (Khan 2003) and the United States (Lantz (ed.) and Flowers (ed.) 2010). There are additional hindrances in Japan, where a lottery system determines in part the ability to interconnect with the grid system (Maruyama 2010). In Switzerland, Ireland and Japan, wind development is further complicated by expiry dates of approvals or licenses (Geissmann 2010; Maruyama 2010; McCarthy 2010).

Planning processes and licenses depend on whether the wind farm is planned as onshore or offshore and if it is sited on private or state-owned land. In the United States, developable offshore land is generally state property which necessitates a lease from the government. In Ireland a lease or license also has to be obtained for offshore developments (McCarthy 2010). A new framework for the consent process has been developed in the UK taking account of the first experiences with offshore consent processes (Gibson and Howsam 2010). In many cases, few formalized offshore wind regulations exist (Lantz (ed.) and Flowers (ed.) 2010), but experience could be drawn from the offshore oil and gas industry even if there are important differences to consider (Snyder and Kaiser 2009).

The local planning context is important as local authorities often have decisive power. However, knowledge, resources and available planning procedures at the local level are often not adequate for wind developments (Khan 2003; Lantz (ed.) and Flowers (ed.) 2010; McCarthy 2010).

In Germany, the question of how to deal with wind farms reaching the end of their life spans is dealt with in the process of "repowering" (Neddermann et al. 2009; Windenergie Agentur Bremerhaven 2009). In Greece, some badly maintained wind farms, referred to as "industrial ruins," have made people suspicious of new developments (Dimitropoulos and Kontoleon 2009).

Table 3-2: Planning guidelines overview

Country	National/Regional/Local	Title	Year
Canada	National/regional/local	Guidelines to minimize possible adverse effects on human health and wildlife	
Finland	National/regional/local	Spatial planning guidelines with effects on the planning on lower levels	Review in 2008
Germany	Local	Guidance for repowering	2009
Ireland	Local with central appeals board	Guidelines for local authorities on how to include wind energy in development plans and guidelines for local authorities on all items to be considered during an application	
Japan	Regional/local	Guidelines for land use, particularly for wind power generation	
Norway	Regional/local	Guidelines for planning and localization of wind energy for municipalities and counties	2007
Switzerland	National	Planning recommendations	2010
United States	National/regional/local	Generally, state and local wind energy guidelines and ordinances are developed to minimize the potential for conflicts. Federal agencies intervene if there may be impacts to radar systems, military installations, or if endangered or threatened species are present. Federal agencies also regulate the building of projects on federal lands.	

3.4. Strategies: from policy to local acceptance

Policies, concepts, and implementation procedures are often issued at the federal or state level. The projects on the other hand are settled in a local or regional context. To implement policy it is fundamental to generate support and acceptance from decision-makers at the local level. The following section tackles some aspects of this reality.

A consistent approach to approving wind energy projects has been requested in different countries. This addresses coordination between departments on the state level; between energy, agricultural, environmental policy, etc.; and between the state, regional, and local levels (Khan 2003; Schlegel and Bausch 2007; Schmid and Schuppli 2009). In this context, the need for a well-defined role for the bodies involved in planning and decision processes is mentioned as well: Clear affirmations are needed where wind power is wanted and where other uses of the landscape have priority. Consistency between affirmation of politicians and officials has been a topic in Ireland (McCarthy 2010). In several countries such as in Finland (Koskinen and Laitinen 2010), efforts are being undertaken to unify the work of local officials. A discussion of centralized versus decentralized and hierarchical versus locally based decision-making can be found in Cowell (2007) and Nadai (2007).

Edelstein (2004) introduced a system of “checks and balances” between several authorities to review decisions in order to prevent “bad projects” and to find appropriate balances between various impacts of wind power. State review processes for example offer the authority the

chance to overturn unfounded rulings by local officials (Lantz (ed.) and Flowers (ed.) 2010). Similar thoughts were raised by Valentine (2010): While some approaches like top-down regulation might fail when pushed through in isolation, they might provide positive results when introduced in combination and / or by collaborative approaches to offset negative implications. Outhred et al. (2002) outlined the identification of externalities and stakeholders within a framework that also enables solution negotiation while Schmid and Schuppli (2009) recommend consideration of formal and informal political instruments.

Parkhill (2007) wrote about the bilateral information of processes. Translation is usually neither spatially homogeneous nor smooth from the national policies to the local level or from state renewable energy portfolio standards to local siting decisions (Lantz (ed.) and Flowers (ed.) 2010). The same is true for feeding information from the local experiences back into the legislative or regulatory policies. But there have been positive and negative examples where experiences with a project had the potential to expand up to a national level and influence policy (Create Acceptance 2008).

Several authors have named early involvement in the planning and decision process (for example, in the form of pre-development multi-stakeholder planning processes) as a possibility to implement national approaches at the local level (Khan 2003; Breukers and Wolsink 2007; Geissmann 2010; Lantz (ed.) and Flowers (ed.) 2010; McCarthy 2010); see also Chapter 6. Jones and Eiser (2009) pointed out that a better understanding of why a segment of the population opposes a specific project would allow selecting less controversial sites. A neutral intermediary has been highlighted as positive input into a process amongst others by Jegen (2008), Schmid and Schuppli (2009) and Strub and Ziegler (2009).

Some communities have taken initiatives to support this transfer from national to local wind deployment by setting their own renewable or greenhouse gas reduction targets (Koskinen and Laitinen 2010) or by a collaborative formulation of a “New Energy Vision” (Maruyama 2010). Regions with a high population density but ambitious targets might take a different approach to states with a low population density – e.g. by emphasizing smaller-scale, community-based renewable energy production (Lantz (ed.) and Flowers (ed.) 2010).

4. Stakeholders

The first section will introduce general explanation models for the opposition or the support for wind energy. The following sections collect information about various stakeholder groups involved in wind power development. The presentation of the stakeholder groups follows the model of Wüstenhagen et al. (2007).

The aim of the chapter is to discover cross-border characteristics of the discussion and argumentation patterns and to find areas for further research and implementation efforts targeted at the relevant stakeholder groups. Table 4-1 shows an overview of the types of stakeholder groups as discussed in this report.

The chapter does not provide a comprehensive listing of all stakeholder groups but merely highlights commonly encountered groups. Stakeholder groups vary depending on the country, the region, and local communities.

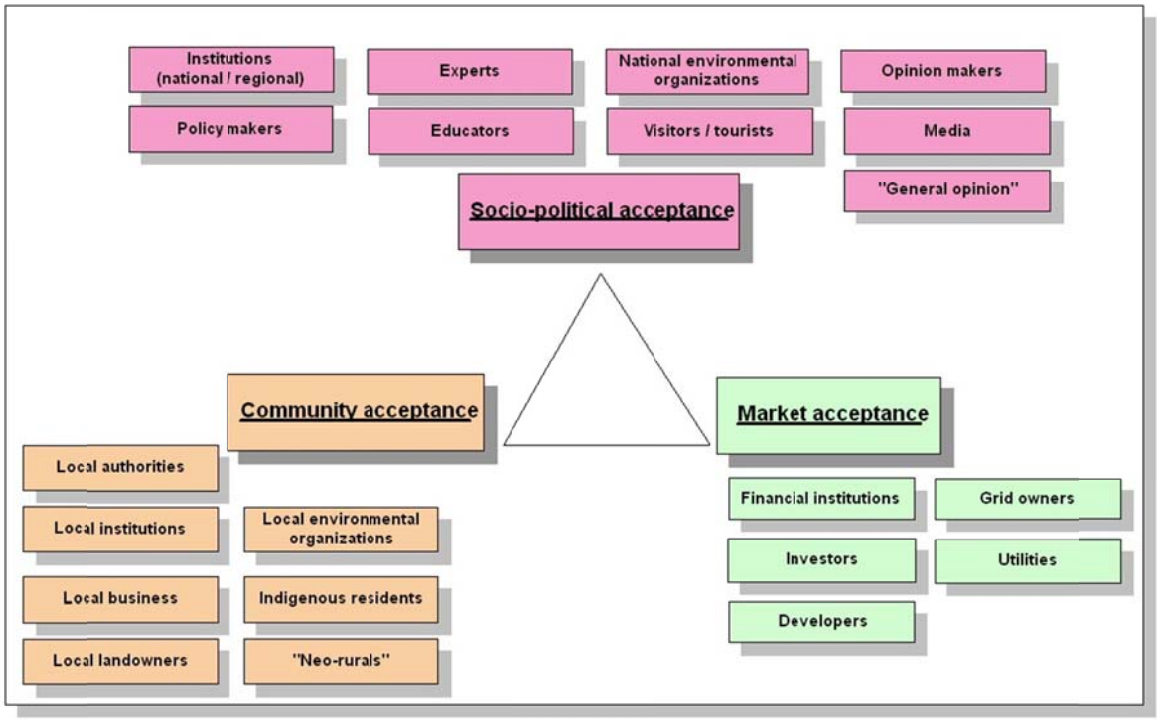

Figure 4-1: Stakeholder framework

4.1 General stakeholder perspectives toward wind energy

Over the past decades of social acceptance research, several ideas and concepts have developed to explain some of the attitudes found in the renewable energy discussion, but especially for wind energy projects. The following list gives an idea of the diversity of these concepts, we refer to the respective publications for an explication and a discussion of the concepts:

- NIMBY - “Not in my backyard” (Wolsink 1994; Bell et al. 2005; Jones and Eiser 2009; Zografos and Martínez-Alier 2009; Aitken 2010)
- “Four forms of opposition” (Hammarlund et al. 2004)
- “No-Sayers and Yes-Sayers” (Damborg and Krohn 1999)
- The “U-curve”, respectively the “familiarity hypothesis” (Wolsink 1990; Warren et al. 2005; Eltham et al. 2008; Lemieux and Léger 2008; Aitken 2010)
- The “characteristics theory of value” and the “random utility theory” (Whitford et al. 2008)

The analysis by Devine-Wright (2007) of factors influencing attitudes towards wind energy and the description of individual weighing of costs and benefits (Lantz and Tegen 2009; Lantz (ed.) and Flowers (ed.) 2010) shall be mentioned here as well.

The development of arguments in support of and against wind energy have been analyzed specifically (Bell et al. 2005; Kaldellis 2005; Szarka 2007; Barry et al. 2008; Solli 2010). An interesting feature of every controversial project is the balance of power between proponents and opponents. But as Schmid and Schuppli (2009) outlined, an asymmetrical power situation does not necessarily end in negative outcomes if all parties are interested in a "fair" outcome.

The understanding of people towards wind energy shapes the attitudes towards new projects (Anne Marie Simon Planning and Research 1996; Dimitropoulos and Kontoleon 2009). Create Acceptance (2008) highlighted the importance of social networks: On one hand, the network of the actors involved will influence a project (Lyrette and Trépanier 2004). On the other hand, the social references of a single person will influence an individual's opinion towards a project.

4.2. Socio-political acceptance

4.2.1 Formation of general opinion

Opinion polls over the past decades have usually revealed support for renewable energies including wind energy. In Japan, wind power even has the status of an environmental symbol. It is also increasingly being used in advertisements (Maruyama 2010).

An evolution of the general opinion and the related politics over space and time has been reported most clearly in the United States (Meyer and Steinbiss 2008; Lantz (ed.) and Flowers (ed.) 2010). However, in the United States, reactions to wind energy vary on a regional or local scale which is often reflected in local siting approvals (Lantz (ed.) and Flowers (ed.) 2010).

As pointed out by DiBlasio-Brochard et al. (2010), a possible affirmation that a person supports renewable energy is the purchase of green electricity in addition to state prescribed renewable energy portfolio standards or federally regulated feed-in tariffs. However, the percentage of people buying green certificates or supporting renewable energy technologies financially is much lower than the percentage supporting renewable energy technologies in opinion polls.

Media analyses of case studies (Zoll (ed.) et al. 2001; ECON Analysis 2005) are available as well as more general affirmations about the importance of media in influencing perceptions of wind energy (Devine-Wright 2007; Jegen 2008; Cision 2009). There is not a great deal of meta-information about the use of newer communication technologies such as the Internet, Facebook, Twitter and so on, but arguably these technologies can be employed to organize and inform wind energy supporters and opponents. Such networks may ultimately come to have a broad reaching influence on broader public opinion of wind power (Lantz (ed.) and Flowers (ed.) 2010).

Among the national opinion makers, there are environmental organizations, university professors, experts and politicians. These types of individuals and institutions can exert influence on general public perceptions and opinions. In Japan, opponents have also managed to influence

general opinion against projects on by conducting campaigns using the media (Maruyama 2010). At the same time however, popular opinion can operate in the reverse too, influencing national figures: Meyer and Steinbiss (2008) mention the need in the United States for the general public to show their politicians that they want renewable energies so that the politicians can speak for renewables in the Congress.

The significant influence and active lobbying of environmental organizations and other groups for and against wind power can be illustrated by a national landscape protection organization in Switzerland: One organization opposes wind energy in the country without any room for discussions and has a strong word in the whole debate. Other environmental organizations in Switzerland work with the wind industry and its association to define criteria by which wind deployment is acceptable (Geissmann 2010). Similar developments are discernible in Finland (Koskinen and Laitinen 2010) or the UK (Szarka 2007). It has been noted though that there is sometimes a divergence in environmental organizations that are active on the local and the national level. While the national organization will act in favor of wind to combat climate change or to avoid other conventional electricity production technologies, the local organization might oppose a specific project because it wants to protect the local landscape or wildlife. Toke et al. (2008) found that the tradition of strong institutions promoting values of landscape has an influence on the strength of landscape opposition to wind deployments.

4.2.2 General opinion for on- and off-shore wind farms

Onshore wind technology is already well developed and much experience has been gathered. An emerging topic concerning onshore wind is repowering. Practical experience from Germany indicates that decision processes involved in repowering will differ from those of new wind farms (Neddermann et al. 2009; Windenergie Agentur Bremerhaven 2009). Apart from the distinction of new wind farms versus repowering, a wind farm in or near a forest or in the mountains is not accepted in the same way as wind farms in agricultural areas (Ek 2002; Grady 2002; SEI 2003).

Offshore on the other hand has just started to gain momentum. While some offshore wind farms have already been built, especially near shore, many projects are in the planning process in Europe and North America (DiBlasio-Brochard et al. 2010; Hübner et al. 2010; Koskinen and Laitinen 2010; Lantz (ed.) and Flowers (ed.) 2010; McCarthy 2010; Solli 2010), partially with accompanying research already outlaid (Solli 2010). The engagement for offshore is judged differently depending on the existing onshore capacities: In Denmark or Germany, onshore wind capacity already delivers a relatively high portion of the electricity needs compared to for example Ireland where wind represents a small portion of installed capacity today (McCarthy 2010).

In choice experiments or opinion polls, offshore wind farms are usually preferred to onshore wind farms (Ek 2002; Koskinen 2008). However the actual distance from shore is one of the important factors for perception (Bishop and Miller 2007; Ladenburg 2009; Hübner et al. 2010). This does not prevent social acceptance conflicts around offshore plans and many issues around onshore wind farms reappear, maybe with slightly different characteristics than for onshore (Haggett 2008). Some issues are being discussed for both types of projects such as visual impacts and identity connected to the seascape or landscape. Other issues have to be differentiated such

as the number of people concerned or projected impacts on land use and wildlife. There are "myths" about both types of wind energy projects, but the research and the actual knowledge are at different points, e.g. the effects on various species.

4.2.3 General opinion concerning the scale of turbines and projects

Research indicates that people prefer smaller sized wind farms such as farms of 12 turbines or fewer (Ek 2002; Failte Ireland 2008; Whitford et al. 2008; Barry and Chapman 2009). At least one case in Montana (United States) suggests that introducing community or locally -owned wind can lead to greater understanding and acceptance of larger-scale wind (Lantz (ed.) and Flowers (ed.) 2010). Additionally, there is the distinction between large and small turbines whereby one study indicates that it is not the height of the turbine but the distance from residential areas that makes the difference in acceptance (Meyerhoff et al. 2010).

While large-scale wind farms often serve the utility sector, small-scale wind farms could provide electricity for houses, farms, businesses, or small communities. While small-scale wind farms could overcome some opposition faced by large wind farms, there are specific barriers for their diffusion such as regulation or financial support (Hübner et al. 2010). In Germany, a small-scale wind energy association has been founded that aims to promote small-scale wind turbines on the national market (BVKW 2010).

A factor gaining importance over time is the presence of existing wind farms in the area when proposing a new project – there is the possibility of weariness and overgrowth. Examples for this have been found amongst others in France (Szarka 2007) and New Zealand (Graham et al. 2009). The trend toward larger turbines could also increase social acceptance issues as reported e.g. from Ireland (McCarthy 2010), Greece (Kaldellis 2005), or New Zealand (Barry and Chapman 2009).

4.2.3 General opinion on transmission lines[7]

Transmission has become an issue in connection with social acceptance of wind energy because good wind resources and space for the wind farms are often found far away from where the bulk of the electricity is consumed. On the socio-political level, these transmission lines are often accepted, while on the community acceptance level, building new transmission lines may face opposition (Koskinen and Laitinen 2010). While Ireland has so far not seen national anti-wind groups, there are numerous well organized 'pylon pressure groups' fighting opposed to the development of new over-head high voltage infrastructure in their area (McCarthy 2010). An ongoing project on the impact of overhead transmission lines on social acceptance is based in Germany (Forum Netzintegration Erneuerbare Energien 2009). A documented example of the type of multi-stakeholder planning necessary to facilitate siting of critical new overhead transmission lines can be found in Lantz (ed.) and Flowers (ed.) (2010).

4.2.4. Institutions

In several countries, there appears to be a need for more coordination among different agencies and ministries on the national level. Coordination is also needed between national policies, state and regional interpretation, and local implementation (CA-OWEE 2001; Geissmann 2010;

[7] See Chapter 5 for a discussion of issues surrounding the distribution of benefits and costs of transmission projects.

McCarthy 2010). Enhanced coordination may help to resolve industry claims that decisions depend on the opinion of the individual taking the decision (McCarthy 2010). In many countries, there is more than one ministry in charge of wind energy development, while in others there has been no strong state approach until recently, e.g., in Sweden (Khan 2003) or Norway (Solli 2010). The progress project (2008) identified the primary bottlenecks causing delay for wind energy projects that reinforce the need for coordination: These included environmental protection, defense over tourism / heritage, aviation, and fisherie agencies to the industry and trade. In Switzerland, the main ministries concerned with wind energy have established a common base to deal with the topic (Geissmann 2010). The United States have a complex set of permitting checks and balances, as well as home rules[8] in some localities. At the same time, when local authorities must make decisions, they often benefit from state assistance in the form of guidelines and information (Lantz (ed.) and Flowers (ed.) 2010). In Ireland, the national authorities have issued planning guidelines and Ministerial circulars. However, uncertainty remains because the guidelines are open to interpretation (McCarthy 2010).

Local authorities may not have sufficient resources to deal with the incoming proposals and this can also be true for regional or national bodies (Solli 2010). It has been noted that wind projects present authorities, especially on the local level, with a new role in decision making. Moreover, technocratic or hierarchical decisions by authorities or experts often do not create sustainable solutions for wind energy projects; this requires a concerted process where the different opinions may be voiced (Feurtey et al. 2008, Schmid and Schuppli 2009). A question in this context is the trust in authorities and administrative bodies (Jegen 2008).

As shown in Canadian and Swiss provinces, regions and states are often supportive of wind energy (DiBlasio-Brochard et al. 2010; Geissmann 2010). As they usually have relevant parts in the decision and planning process, such as the issuing of spatial planning schemes, this is important for wind deployment (Zografos and Martínez-Alier 2009; Geissmann 2010; Lantz (ed.) and Flowers (ed.) 2010; McCarthy 2010). On the other hand, the interpretation of state or national rules and how they implement planning processes can be quite different among regions or localities and such differences can lead to variability in the way wind energy is treated or allowed in specific areas (McCarthy 2010). In Germany, the “Länder” have a leading role concerning renewables, which can be seen e.g. in the “Leitstern”-Project (Unendlich-viel-energie.de 2008) or in “perspectives for sustainable 100% renewable energy regions”-project (100EE 2008).

4.2.5. Educators

The only study known on attitudes of teachers towards renewable energy stems from Greece (Liarakou et al. 2009). The need for education, knowledge building, and awareness rising on the other hand is mentioned in several parts of this report and advocated by many authors.

A review of the country reports shows that every country has environmental education as part of the general curriculum, but often without renewable energies tackled specifically, and has some specific programmes on renewable energy and / or climate change for schools. Additionally, there is an exchange between experts and the public or between agencies and the industry or the

[8] "Home rule" establishes local decision-making in areas where the affected communities have an important role in this context.

public. For example national institutions disseminate information about renewable energy technologies and help raise awareness.[9]

4.2.6. Visitors and tourists

The question about wind turbines deterring tourists is a recurring one. Studies have been conducted on observed and expected behavior. Interestingly, some studies have found either no effect or a positive effect on tourism, while the others showed more mixed results (Aitchison 2004; Kuehn (ed.) 2005; Ladenburg 2010; Lantz (ed.) and Flowers (ed.) 2010). Some insights shall be summarized here:

- While concerns about changes in landscapes and their effect on tourism exist, some people see wind farms as an attraction instead of a disturbance (Koskinen and Laitinen 2010). Others are concerned about wind turbines interfering with sky sports such as paragliding and hang-gliding (Nakazawa 2009).
- Random tourists tend to be more positive than vacation homeowners in the area (Koskinen and Laitinen 2010).
- Conflicts with tourism might be negligible in many countries today, but they might become more pressing with an increase in deployed capacity (Geissmann 2010; Koskinen and Laitinen 2010).
- People working in tourism and associated professions have been found to be more open-minded and more supportive of wind development than people without much contact to tourism (Dimitropoulos and Kontoleon 2009).
- A substantial minority of beachgoers say they would avoid beaches with visible offshore wind turbines, but the avoidance diminishes with farther location from the shore. On the other hand, the attraction of respondents to offshore wind boat tours and to beaches where wind turbines are visible and that they usually do not frequent is substantially greater than the reported avoidance of these beaches (Blaydes Lilley et al. 2010). One must also consider the difference between effects on local tourism and a general effect on tourism. If a respondent would avoid a certain location due to wind turbines, he or she might visit another location (Lantz (ed.) and Flowers (ed.) 2010).
- In a Canadian survey (Prince Edward Island), while only 44% of both residents and visitors agreed that a wind farm adds to the area's attractiveness, about 81% of both residents and visitors disagreed that wind farms are a poor use of the island's land base. Furthermore, 71% of residents agreed that wind farms are an attraction for visitors to the island (The Tourism Research Centre School of Business 2008).
- Respondents who could see wind farms during the interview process had a higher-than-average positive attitude toward wind farms (Richard Guay Marketing 2004).
- (Hübner et al. 2010) pointed out that surveys about onshore wind farms provided empirical evidence for no negative influence of wind farms on tourists (Günther and Meinken 2000; Hilligweg and Kull 2005; Vogel and et al. 2005) while there is no offshore acceptance information yet. Tourists' acceptance of the first offshore wind farm in Germany will be monitored (Hübner et al. 2009).

[9] See Section 8.2. for a list of exemplary projects from the participating countries.

4.3 Community acceptance

4.3.1. Local population

The local population is a heterogeneous group with different stakeholders having their own agendas such as:

- **Landowners:** Possible turbine hosts, this group is often the first to be contacted by developers.
- **Local businesses:** Depending on the business — construction, tourism, retail, etc. — members of this group will react differently to a wind farm proposal.
- **Local environmental organizations:** While their national organization might support wind to combat climate change, the local organization might fear for the local nature and wildlife. Local organizations might even be created specifically to promote or to oppose a wind farm project.
- **Municipal utilities:** This group is often concerned about costs, reliability, or operational issues of integration similar to utilities in general. However, municipal or cooperative utilities specifically tend to face insufficient transmission to access wind resources and are often entwined in long-term power contracts, which limit their ability to acquire new generation resources. Finally, as rural and sometimes isolated institutions, municipal utilities in some countries lack contact to broader political and social movements, which may require new policy development (Lantz (ed.) and Flowers (ed.) 2010).
- **Local officials:** It is often up to this group to decide on wind projects as representatives of the community (Hammarlund et al. 2004), so they should represent the overall social acceptance of the project. But depending on the local or regional culture, they may have to learn first to take account of the different voices in the community (Feurtey et al. 2008, Schmid and Schuppli 2009).
- **Silent majority:** The largest part of the community, this group is frequently indifferent or sees only some benefits as well as externalities such as noise or visual impacts of the project (Stadlober and Hahn 1999; Schmid and Schuppli 2009). Dienel et al. (2008) propose to look at this majority not only as passive, affected people but as consumers of (renewable) energy, as active citizens participating in discussions, as voters, as opinion and decision makers in their professions, as parents or educators. Negative feelings can be caused by project externalities but might be overcome by involvement (Stadlober and Hahn 1999).
- **Locals fiercely opposed to wind power in general and/or a specific project:** This group often consists of a vocal minority. Several studies find extreme opposition to be limited to a few percent of the local population (Failte Ireland 2008; The Tourism Research Centre School of Business 2008), and even fewer take legal action, but opposition may be more widespread than the authorities are aware of (ECON Analysis 2005). The ability of the opposition group members to make their project concerns the concerns of a wider public depends on a variety of factors (Lyrette and Trépanier 2004). Objection letters by single persons or civil initiatives analyzed for German wind farms showed mainly ecological issues (birds, CO_2 reductions, land destruction), economical concerns (losses on estates, low efficiency, impacts on tourism), cultural heritage concerns, and individual nuisance issues (Zoll (ed.) et al. 2001).

Toke et al. (2008) mentioned the importance of local networks (positive and negative toward the wind project) as they constitute an important institutional variable for the application. Especially when the local authorities are not positive toward wind power, opposition groups have more influence (also mentioned in (Schmid and Schuppli 2009)).

Feurtey et al. (2008) draw our attention to the characteristics of the social setting of the specific site. Local characteristics influence the ability to seek solutions and mediation of interests. When there are divisions in the communities before the proposal shows up, the project can become a proxy for old conflicts (Jegen 2008). Gross (2007) stated that divisions in local communities frequently happen where there are conflicting perspectives of values and rights and conflicting interests for land use and natural resource management. She also concludes that communities with a strong "social well-being" have a greater ability to evaluate and to adapt to changes such as new infrastructure developments.
Some of those divides in local communities include:

- **Elected officials versus population:** People may not trust their elected municipal and provincial officials in wind energy questions due to incompetence, lack of the necessary training to face the developers, or conflicts of interest when officials deal with wind turbines on their own land.
- **Urban versus rural:** The electricity generated in the country is primarily used in cities. This is also where important decisions on electricity generation are perceived to be taken. The rural population does not want to trade their landscapes for electricity that serves urban demand (Krumdieck 2009; Zografos and Martínez-Alier 2009).
- **Generational versus neo-rural:** Local populations who have lived in rural communities for many generations often value the economic benefits of wind energy. People moving to the country for the landscape, peace, and absence of industrial development more frequently oppose new wind project development in the rural area in which they have chosen to live (Schmid and Schuppli 2009; Koskinen and Laitinen 2010). Ohgishi et al. (2006) found that the judgment of a landscape is greatly affected by a more comprehensive understanding of landscape by the local population.

Significant differences in the attitudes toward renewable energies among regions have been noted in the United States, Japan, and Finland (Koskinen and Laitinen 2010; Lantz (ed.) and Flowers (ed.) 2010; Maruyama 2010). General attitude toward "green" issues, awareness of energy challenges and renewable technologies, familiarity with wind power, the availability of open spaces, and the importance of the fossil fuel lobbies have all been noted to influence variability in regional perceptions (Meyer and Steinbiss 2008).

Another point in this context is the history of the community with wind power developments (i.e., past experience informs acceptance of new projects and wind energy generally). Lantz (ed.) and Flowers (ed.) (2010) described an example to show that if the population understands and accepts one project, it is likely to accept additional projects. Acceptance after construction might even be higher than before the project was announced, such as described by SEI (2003), Lemieux and Léger (2008) and Rees (2009), but this cannot be taken for granted and should not be attributed to resignation to wind development on the part of the local population. Rather it should be attributed to the responsible work of project proponents (Aitken 2010).

4.3.2. Local institutions

Local governments or authorities are often described as key for the planning and siting of wind farms (Khan 2003), and therefore, this is where a lack of social acceptance becomes apparent (Breukers and Wolsink 2007). Some regions have actively sought to attract new wind development and have even formulated their own renewable energy goals to promote their use (Lantz (ed.) and Flowers (ed.) 2010; Maruyama 2010).Other communities seem to "underperform" with regard to their wind potential (McCarthy 2010).

In several countries, communities have been said to lack the necessary experience, resources, and information to take informed decisions. They can become easily influenced – it is a challenge to "distill the truth" (Lantz (ed.) and Flowers (ed.) 2010) and to find a balance between different goals, e.g. landscape, tourism, health concerns (Jegen 2008; Strub and Ziegler 2009; Ciaccia et al. 2010; Lantz (ed.) and Flowers (ed.) 2010). Wehnert (BMU 2007) advocates a framework for the building of knowledge concerning renewables on a local scale to get away from case-by-case decisions.

4.4 Market acceptance

4.4.1. Utilities and grid owners

The group of utilities and grid owners is a very heterogeneous group, concerning structures and ownership as well as attitudes towards wind energy or renewable energy technologies in general. Grid operators have been identified as "bottleneck organizations" in many countries (PROGRESS 2008) or described as rather conservative forces that take time to get involved (Schlegel and Bausch 2007). On the other hand they represent the main drivers in other countries where governments and consumers are demanding "green electricity" (Geissmann 2010). Many of the utilities, especially the large ones, have diverging attitudes towards renewables inside their own company. A possible consequence is the creation of "green spin-offs" (Geissmann 2008). Aside from cost, the strongest objection to wind energy voiced by utilities and grid owners is the integration of variable output generation into the grid.

Nevertheless, this stakeholder group is pivotal because utilities and grid owners perform various functions in the development of renewable energies, such as investors for and developers of their own projects, issuing tenders for the new renewable generation, fulfilling quotas, purchasing of and integrating renewable power production.

Before liberalization of the electricity markets started in the 1990s, the utility industry was monopolistic and business strategies were dominated by long-term investments and conventional technology. With liberalization new avenues for independent power producers and alternative technologies emerged. Throughout this process however, reliability has remained paramount and today utilities and grid owners continue to be subject to second guessing by regulators, politicians, and the public when decisions are found to have resulted in less than optimal outcomes. As such, utilities have historically been hesitant to adopt new renewable technologies. Moreover, with required renewal of an aging plant and grid structure and the large-scale integration of variable output renewable energy technologies ("greening of the whole electricity

sector" (EERE 2008)), the industry is facing many challenges. Finding new roles and adapting to new strategies has become important for this sector.

Ownership structures differ a great deal between utilities, from municipal or cooperative to investor-owned utilities (DiBlasio-Brochard et al. 2010; Lantz (ed.) and Flowers (ed.) 2010). Also the size and number of utilities vary significantly: In Germany about 850 grid owners can be distinguished (Hübner et al. 2010), while in Ireland, there are only two electrical infrastructure utilities and one asset owner (McCarthy 2010). Each utility also features its own portfolio of electricity generation as a combination of fossil-fueled plants, nuclear power and renewable energy production. Smaller companies especially struggle to analyze the opportunities or to integrate the variable output renewable technologies. Historically in the United States, wind energy has been competitive and therefore present in utility systems where gas-fueled generation is significant. Wind energy has also emerged in some investor-owned and public / cooperative utilities where state policy has set renewables obligations or in the exceptional cases where visionary leaders have viewed wind energy as a new opportunity (Lantz (ed.) and Flowers (ed.) 2010). In other contexts, large public utilities often have the chance to start renewable energy projects without requiring a high return on investment, because "green electricity" is required or because they want to acquire a "green image" (Geissmann 2008). Acceptance for renewable energy can be increased by regional connections of the utilities to the area where a project is planned (Geissmann 2010).

In many countries, there are now studies ongoing where grid operators are evaluating how much variable output generation from renewable energy technologies can be integrated into the system and how the transmission network would have to be modified to reach the established targets (DiBlasio-Brochard et al. 2010; Koskinen and Laitinen 2010; McCarthy 2010). Hornung (2009) has documented the case of a utility that has completely changed its opinion in the past years. In the 1990s, the German feed-in law subsidizing wind power was legally challenged by German utilities, amongst others due to the financial burden of paying state-imposed minimum prices for generation from renewable sources. The position of the utilities has since then evolved and the utilities have become important players (Szarka 2007). Limitations of grid access and favoring of conventional structures is still a problem e.g. in Japan (Maruyama 2010). In other countries such as Germany, the priority of renewables is actively supported by different initiatives (BMWI 2010; Hübner et al. 2010).

4.4.2. Developers and investors

Developers are in contact with the planning and decision processes and therefore with the authorities, but also with the population (Bürer and Tucci 2009; Strub and Ziegler 2009). Criticism has been raised about nontransparent procedures and the lack of communication with the population concerned (Jegen 2008; Strub and Ziegler 2009; Aitken 2010). Developers must also defend the wind projects against naturalists and other opposition groups (Maruyama et al. 2008). A learning process seems to have taken place in certain areas such as Quebec where developers have understood that those seeking shortcuts can put the whole industry at risk (Jegen 2008). Moreover, increasing competitive pressure and tighter financial markets have forced developers to minimize risks, including social acceptance risks, by choosing sites that are less likely to create conflicts and applying industry best practices in their interactions with local populations (Lantz (ed.) and Flowers (ed.) 2010). Norway, where support from authorities is

lacking, has observed large installations in areas with good wind resources but which conflicted with environmental priorities. In the future, "second best" areas with less environmental impact should be considered as well (Solli 2010). In Finland, developers are described as one of the most active groups in the enhancement of social acceptance (Koskinen and Laitinen 2010). Gray et al. (2005) put it as a question of image – do the developers seem to honestly promote renewable energy or are they perceived to just maximize their profit?

Successful deployment in Spain has been explained by public-private partnerships and powerful interest associations (Dinica 2008). In Germany, highly motivated innovators achieved a successful industry with powerful associations (Hübner et al. 2010). In Japan, the community model has attracted many investors but the top four wind power producers still have a total share of about 50% (Maruyama et al. 2007). In Norway, the industry appears to be waiting for a support mechanism to complete an era of reluctant support from the authorities (Solli 2010). In Finland, there are more developers than expected compared to the installed capacity. Some companies are Finnish, some foreign, some focusing on wind, some having a wider portfolio (Koskinen and Laitinen 2010). In Switzerland, most developers are owned by utilities (Geissmann 2010). In Canada, the wind sector is growing rapidly whereby there are mostly private investors at work (DiBlasio-Brochard et al. 2010). In Ireland, a report on job and investment potential was published in 2009, with opportunities for the construction sector and additional benefits for the electricity consumer, local economy and society (Deloitte and IWEA 2009). On the other hand, the financial crisis still renders financing rather difficult and the nature of the electricity market in Ireland still constrains the amount of energy which can be sold i.e. the resource exceeds national demand or available grid capacity (McCarthy 2010).

4.4.3. Financial institutions

While financial institutions play an important role in several countries such as Japan and Germany (Hübner et al. 2010; Maruyama 2010), banks are less involved in Canada or Switzerland (DiBlasio-Brochard et al. 2010; Geissmann 2010). The most important factor in the involvement of financial institutions is risk: In Canada, conservative lending guidelines and an incomplete understanding of the economic effects of wind energy prevent the direct involvement in project finance, however, investment in completed projects is an option (Gorman 2007; Johong et al. 2009; Timmins 2009). Risks and the economic performance also seem to prevent Swiss banks from investing in wind energy (Bürer and Tucci 2009).

In Germany, several banks are heavily involved in wind investments. In this context the security offered by law and policy along with significant experience with high quality installations appear to increase interest from the banking sector. In addition, the overall contribution of the wind energy sector to the broader economy is likewise important in securing interest from German financiers. Offshore developers on the other hand seem to face more difficulties in acquiring investors (Hübner et al. 2010).

In the United States, the perception of wind energy risks and fear of insufficient rate of return have diminished, in turn, increasing interest from the investment community. Moreover, many investors today seek investment in wind energy as a contribution to financial, social, and ecological capital (i.e., the "Triple bottom line"). Perceived risks are less today, in part due to increased maturity in the U.S. market which has led to increased professionalization and more

responsible development (e.g. with respect to wildlife or health concerns). At the same time tax benefits, productivity gains, and improvement in design and construction have improved the economic benefits and encouraged new investors to enter the sector (Lantz (ed.) and Flowers (ed.) 2010).

In Ireland, “access to finance is a cause for growing concern within the sector as banks lend less” (McCarthy 2010). Financing is hampered by uncertainty with respect to issues such as variable transmission loss adjustment factors, firm grid access and planning concerns due to seemingly conflicting national policies. As a result, Ireland faces significant ongoing challenges in meeting its renewable energy goals.

Part III: Variables Influencing Social Acceptance

While the previous parts focused on the underlying framework such as policy and interest groups that govern the deployment of wind energy the following chapters deal with topical areas of concern and the characteristics of projects and the wind parks that either diminish or foster social acceptance. Among the issues covered are:

- Standard of living and quality of life (e.g., noise and lighting, annoyance) (Chapter 5)
- Concerns for landscape and ecosystems (Chapter 5)
- Distribution of benefits and costs (Chapter 6)
- Procedural questions (Chapter 7).

Chapter 8 discusses a wide range of implementation issues such as visualization, communication campaigns, best practice guidelines, and mechanisms for creating or highlighting additional benefits.

A study by Gray et al. (2005) describing the situation between offshore wind farm developers and fishermen illustrates many of the social acceptance issues that are typical of wind energy projects and highlighted throughout this report: There were negative characterizations of each party by others (communication and consultation), inadequate consultation processes organized by the developers (procedural design / implementation strategies), controversial claims amongst the fishermen as to compensation (distributional justice), lack of scientific data on marine environmental impacts (ecosystem).

Kaldellis et al. (2003) attempted with their paper "Environmental impacts of wind energy applications: Myth or reality?" to invalidate the most common objections raised by those opposing wind energy projects: visual impact, noise, impact on birds, land use, energy balance and material requirements, and diminution of air pollution. While there are some "myths" around wind power for which no proof has been found, there are also impacts that may be of concern. Taking these concerns seriously often means engaging in careful planning, conforming to the legislative requirements, applying state-of-the-art design and operations practices, involving the affected communities in project siting and design, and providing trustworthy information. Often such strategies are able to reduce many of the persistent concerns that exist with respect to wind projects (Hammarlund in Pasqualetti (2002) and Ott et al. (2008)).

Relevant literature summarizing factors that influence social acceptance based on case studies includes (Jobert et al. 2007; Mallett 2007; Dimitropoulos and Kontoleon 2009; Graham et al. 2009). Nevertheless, Create Acceptance (2008) concluded that "our understanding of the non-technical forces shaping the application of new energy technologies, particularly at the local and regional level, is still underdeveloped." As a result, an analysis of the stakeholder views and creating an understanding of the general perspective of a community view on the innovation should be an elemental part of good management practices.

There are some parallels between acceptance of wind energy projects and energy technology acceptance in general: Mallet (2007) studied technology adaptation using the example of solar

heaters in Mexico taking into account the decision-making process and technology cooperation. Prades-López et al. (2008) studied lay perceptions of nuclear fusion and formulated ways of experiencing a new technology and the influence of framing, talking about, and considering the respective technology. These so-called “discourses” include siting (previous local experience, general attitude towards siting, place and identity, politics of engagement and citizen involvement etc.), lifestyle (preferences regarding future energy supply, risk perception etc.) and investment opportunity (perception of investment decision-making, potential of the technology, public versus private, degree of understanding etc.).

5. Quality of Life and Well-being

Quality of life in the context of social acceptance is discussed here in relation to a perceived or feared (Lantz (ed.) and Flowers (ed.) 2010):

- reduction of one's standard of living and well-being (Section 5.1)
- impact on human health from operating wind turbines (Section 5.2)
- degradation of valued landscapes or places and permanent damage to the area's environment or ecosystem (Section 5.3).

In the first section, general questions of standard of living such as electricity prices, additional income, real estate values as well as quality of life are discussed, while the physical dimensions of light, noise, and shadow flicker are discussed specifically in the second section. The third section discusses general social acceptance issues around ecosystems and wildlife including a specific focus on landscape.

5.1. Standard of living and quality of life

On a socio-political level, standard of living is influenced by a fear of increased electricity rates which might place an additional burden on ratepayers and the economy as a whole. Studies from the United States however show that the costs of electricity generated from wind power are not out of line with existing wholesale power market prices and the cost of integrating wind energy is generally modest (Wiser and Bolinger 2008; Corbus et al. 2009; Ela et al. 2009; Wiser and Barbose 2009; Wiser and Bolinger 2009). In addition, there are other positive associations with wind turbines and other renewable energy sources in the surroundings such as a feeling of independence of “traditional” ways of electricity generation (Geissmann 2010).

At the community-acceptance level, however, standard of living is somewhat more complex. On one hand, an increased standard of living is possible through additional incomes to the community via tax payments, supporting existing and new jobs support, payments to landowners, etc. (Lantz (ed.) and Flowers (ed.) 2010). On the other hand, there are concerns that the visual and noise disamenities associated with wind power projects might reduce property values and in turn impact individuals standard of living (Koskinen 2008; Herkkola 2009; Koskinen 2009; Koskinen 2009). Concerns over property values impacts are supported by the

fact that many forms of industrial development can negatively impact residential property values (Simons 2006).

An array of reports on property value impacts from wind farms exists from multiple countries and with a wide range of results (Charron 2005; Hoen et al. 2009; Kielisch 2009; Wiser and Barbose 2009). However, peer reviewed academic journal publications have generally found little or no evidence to validate concerns of property value reductions from wind turbine installations (Sims and Dent 2007; Sims et al. 2008). This may suggest that current siting and setback distances are sufficient to protect homeowners from the most-significant concerns of potential homebuyers.[10] Alternatively, property value losses may be too infrequent or too small in magnitude to be identified with traditional statistical analysis tools. In their comprehensive study of more 7,000 homes, Hoen et al. (2009) concluded that for residences within a five mile radius of a wind project there is no evidence to support claims of property values impacts. Nevertheless, while they found no statistically significant impact on property values impacts throughout their sample the findings were less definitive for homes cited very close to wind turbines (i.e., within 1.5 km), especially in the period leading up to, during, and shortly after project construction.

Issues around quality of life in connection with annoyance, stress, and impacts on health have heavily influenced the discussions around social acceptance of wind farms. Various studies have been published. For general discussions (Chatham-Kent Public Health Unit 2008; Blackburn et al. 2009; Levy 2010; Rideout et al. 2010). For more specific studies concerning noise or lights, see the next sections. Scientifically justified connections between wind farms and specific impacts on health are possible, but difficult to make. This is in part because the impacts of a wind turbine or wind farm are dependent on many factors such as size, age and type of the turbines, etc. which must be properly controlled. Improvement of the technology has already alleviated some aspects of these issues and applying adequate setbacks may minimize them even further. However, further research on the topic of quality of life is necessary. At the same time, the subjective nature of annoyance, landscape preferences and even stress suggests that quality of life around wind farms could remain a controversial topic regardless of whatever technical or site design solutions are presented (Pedersen 2007; Pedersen et al. 2007; Eltham et al. 2008; Pedersen and Persson Waye 2008; van den Berg et al. 2008; Pedersen et al. 2009).

5.2. Lighting

The need to mark wind turbines by lighting has increased with the trend to taller towers and longer blades (Nielsen 2010). While some might experience the lighting as irritating, recent research revealed no evidence of substantial annoyance caused by obstruction markings, however, on average, small stress effects are evident (Hübner et al. 2010). In the study mentioned, differentiation between different kinds of obstruction markings and their effect on the residents was achieved, also in relation to weather conditions. The minority is strongly annoyed and they are characterized independent from wind park stress impacts by more health problems compared to residents who are not annoyed by lights. Several recommendations on obstruction

[10] This line of thought is consistent with the property values impacts associated with transmission lines, which are found to exist within a short distance of transmission lines, but also to fade at distances on the order of 100 meters (Des Rosiers 2002).

markings have been deduced by the authors as well. In the United States, lighting impacts have not been a topic for research so far, but lighting has occasionally been raised as a nuisance in public meetings (Lantz (ed.) and Flowers (ed.) 2010).

5.3. Noise

Noise is an adverse effect that causes an array of concerns. A study of Moorhouse et al. (2007) for example found that 20% of the operational wind farms in the UK had been subjects of formal noise complaints. It has also been pointed out, by Pedersen and Persson in Hammarlund et al. (2004) that there may be characteristics of noise from wind turbines that make it more annoying than other sources. Background or ambient noise levels, may also be a factor as such levels are often low in the rural or remote areas where wind turbines tend to be sited (Beauchemin et al. 2004). Moreover, the subjective nature of noise annoyance becomes more pronounced at low levels of sound (Colby et al. 2009).

The Acoustics Division of Health Canada's Consumer and Clinical Radiation Protection Bureau has developed proposals for a mitigation criterion for wind turbine noise (Keith et al. 2008; Keith et al. 2008; Keith et al. 2009). Studies dealing specifically with impacts of noise on quality of life include (HGC Engineering 2006; Colby et al. 2009; Rideout et al. 2010). No research so far combines noise quality, quantity, and subjective perception.

In Japan, a dramatic increase in concerns regarding low-frequency noise has been observed since 2008, but there is some evidence that the issue is not usually pursued after construction (Maruyama 2010). The topic has also come up in public meetings in Germany and the United States and in claims of health impacts. Current evidence in the UK and United States suggests that the low-frequency sound from wind turbines is generally not of concern with regard to acute health impacts, and it typically occurs at levels similar to other environmental sources, including the wind itself (Leventhall 2004; Colby et al. 2009). An assessment of the Danish Environmental Protection Agency stated that wind turbines that observe ordinary noise limits do not produce low-frequency noise higher than the recommended limit. Danish Electronics, Light and Acoustics has mapped low-frequency noise from modern wind turbines since 2006 (Nielsen 2010).

5.4. Shadow flicker

Nuisance caused by periodic shadowing has been investigated by German psychologists in the late 1990s and has been taken up by legislation setting maximum exposure (Pohl et al. 1999; Pohl et al. 2000). The Epilepsy Foundation of America (2005) says that wind turbines do not threaten people with photosensitive epilepsy as the movement is too slow and predictable. Maruyama (2010) reported that in Japan, people might cite shadow flicker as one of the reasons to oppose wind turbines, but it has never been the primary source of concern.

5.5. Valuation of ecosystems and place

Issues of negative effects of wind farms on the environment and especially on wildlife and ecosystems have been important in the discussion around wind power. Protection of the species most at risk through wind power and connected with a high emotional value is of crucial importance for social acceptance (Geissmann 2010). Studies from Spain and the UK showed high valuation of wildlife, e.g. over landscape impacts (Álvarez-Farizo and Hanley 2002; Bergmann et al. 2006). There are differences among rural and urban populations in the rating of impacts on ecosystems, however: The rural population accepted negative environmental impacts, but valued wildlife benefits and reductions in air pollution more highly (Bergmann et al. 2006). People show special aversion to projects in wildlife conservation areas or other sites of special environmental interest (Dimitropoulos and Kontoleon 2009).

The species mentioned most include birds and bats. Sometimes others are discussed such as moose or reindeer and in connection with offshore wind also fish and other ocean species. Ongoing research at the first German offshore wind farm "Alpha Ventus" will offer empirical data on the turbines` impact on marine life (RAVE project, DECC (2009)). In Japan, very rare species are concerned, e.g. golden eagles and white-tailed sea eagles (Maruyama 2010). Damage to ecosystems mentioned in studies include cutting of the forests, building of infrastructure and road, shaping of the bottom of the ocean (CA-OWEE 2001; Koskinen 2008; Koskinen 2009; Koskinen 2009; No windfarm 2010). Applying the least damaging technology is usually mandatory, for example, concerning the shaping of the ocean bottom.

Information on effects on various species has been collected (NWCC wildlife workgroup 2008; NWCC 2010), but despite ongoing research, (e.g., in the German project "wind energy and prey birds (Michael-Otto-Institut 2009), there remain data gaps.

One of the earliest studies conducted by Orloff and Flannery (1992) focused on avian activities, habitat use and mortality in northern California. While this study revealed relatively high raptor mortality, the impacts of appropriately sited modern wind turbines has been shown to be much lower (Lantz (ed.) and Flowers (ed.) 2010). In 2009, a review on bird impacts found in international literature was published (Powlesland 2009) stating that "although some of the findings from this review may be relevant to the New Zealand situation, it is important to realize that each wind farm tends to be different as a result of topography, weather, habitats, land use, bird species and turbine characteristics."

Some questions have also been raised that such near-term ecosystem concerns be kept in context. For example, in the United States many wildlife biologists recognize that the implications of climate change on local ecosystems could be much greater than the losses through wind turbines (Lantz (ed.) and Flowers (ed.) 2010) It is also important to keep various ecosystem threats in context (Kingsley and Whittam 2005) (Figure 5-1).

Figure 5-1: Causes of bird fatalities (Erickson et al. 2005)

Norwegian research suggests a strengthening of the knowledge basis of the biological data used in the planning process and that the dialogue between science and society should be opened more broadly (Øverås 2009; Solli 2010). As reported from Switzerland and the United States, exchange with environmental organizations and other stakeholders has facilitated the identification of acceptable locations for project development (James Madison University 2009; Geissmann 2010; Lantz (ed.) and Flowers (ed.) 2010). With experience gathered over time, especially pre-construction site studies and the environmental impact assessment procedures, it is possible to avoid many highly sensitive locations including important migratory pathways or areas that are of similar importance for other species (Environment Canada 2007; Whitford et al. 2008; Nature Conservation Bureau 2010). Agreement has also been sought to stop (curtail production) turbines during high risk migration periods (Lantz (ed.) and Flowers (ed.) 2010; Maruyama 2010).

The question has been raised if wind power is compatible with other environmental concerns or if there is a trade-off between climate protection and nature conservation issues. For Germany, a study stated that up to 50% of the consumption could be produced by renewable energies without offending the most important nature conservation requirements. There are conflicts and constraints from nature conservation that should be carefully respected in any case (Krewitt et al. 2005). Joint goals of nature conservation and renewable energy supply have been approached by Exo (2001), Flashbarth (2004) and Ratzbor and Ahmels in NABU (2004) with among other results the further development of the obligatory impact assessment during the planning process.

Landscape and identity

Landscape is an issue that has been investigated in most countries (Ratto and Solari 1998; Pasqualetti 2002; Nadai et al. 2010). Interestingly, the landscape aspect has a very different weight in the countries investigated. In Switzerland, it is one of the main arguments (Geissmann 2010), while in Japan, there have been few disputes over landscape as the main issue (Maruyama 2010). There is one proposed wind energy site however where the historic context of the site as setting of an important book has provoked a dispute (Association for Transmitting Izumo Culture).

Landscape is part of the identity of oneself and of the community (Feurtey et al. 2008) and emotions are frequently attached to land (Koskinen 2008; Herkkola 2009; Koskinen 2009; Koskinen 2009). The subjective perception of a landscape leads to distinctive and individual cognitive maps and mental representations much as do dialects or characteristics of the people

(Hübner et al. 2010). Wind power is perceived by some to destroy the unity of environment (Johansson and Laike 2007).

The concerns over the identity and the emotions attached to landscapes have to be discussed seriously and should not be disguised as health or environmental concerns (Wester-Herber 2004). For a more in-depth discussion of the importance of landscape for the local identity in connection with wind energy, see among others (Pasqualetti 2002, Feurtey et al. 2008, Hübner et al. 2010).

The following examples from the literature show how these emotions can manifest:

- A recent study from the German North Sea on the attitude toward offshore wind farms found that while the aesthetic seascape perception matters, the main aspects are deeply held convictions of the sea as a natural space and deeply held views of the local landscape that are linked to this local identity (Gee 2010).
- In Lantz (ed.) and Flowers (ed.) (2010), the landscape opposition frequently pertains to "the clash between a particular ideal of landscape beauty and other economic, social, and environmental values." Additionally, as population density increases, "the desire for uncluttered open space grows apace."
- In Spain, the local people tried to show the value of the landscape with so-called "life projects," illustrating that there is more to the landscape than wind (Zografos and Martínez-Alier 2009).

Some argue to best fit wind turbines into the existing landscape, onshore and offshore (CA-OWEE 2001; Schöbel 2008). Others urge creation of a new energy landscape to create a new identity of place based on the original identity (Leuzinger 2007). But this necessitates a new kind of landscape representation and open processes (Nadai and Labussière 2009). Finnish and Japanese communities for example use wind energy for a "green image" (Koskinen and Laitinen 2010) and as an environmental symbol of regional identity (Maruyama 2010).

Devine-Wright (2005) encouraged research focusing on how people come to make sense of the impact of wind power technology on the place they live. Whitford et al. (2008) and DiBlasio-Brochard et al. (2010) present examples of communities that have taken measures to reduce the negative impacts of wind or that have invented strategies to deal best with the situation. There are some strategies to enable compensation for the annoyance caused by wind turbines, e.g. a strong approval of renewable energies or financial benefits. In this sense, there is a relationship between regional identity and sense of justice which is being investigated in a German research project (Schweizer-Ries et al. 2010).

6. Distributional Justice

The following chapter deals with the question of costs and benefits of wind farms and their distribution. Strategies in the form of ownership models, financial participation opportunities, and welfare generation in the affected regions are discussed.

6.1. Distribution of costs and benefits

6.1.1 Costs and benefits

Acceptance of a wind project is decided through an individual weighting of costs and benefits. If people perceive a small group to profit from the project while others, especially those living with the turbines, only have to bear the nuisances, this situation will not favor social acceptance (DiBlasio-Brochard et al. 2010; Lantz (ed.) and Flowers (ed.) 2010). While the negative aspects of wind power are relatively obvious, local benefits are not, e.g. direct and indirect job creation or environmental benefits (Hammarlund et al. 2004). The benefits do not have to be all material, there are also aspects like the compensation of externalities through measures in the landscape (Hübner et al. 2010). For a discussion of property value losses, see Chapter 5.

There is also an aspect of an outsider exploiting a local resource and selling it to people in the city, while the locals do not see tangible benefits for themselves (Haggett and Vigar 2004; McCarthy 2010). In Germany, by federal tax law, 70% of the excise tax remains in the host municipality, while 30% goes to the investor's municipality (Hübner et al. 2010). There are countries where there is none or only minimal compensation for the host communities prescribed by law and everything else left to the developer, e.g. in Finland (Koskinen and Laitinen 2010), in Greece (Dimitropoulos and Kontoleon 2009), in China (Han et al. 2009). Certainly, additional benefits accrue when construction and maintenance are performed by local business and infrastructure being built (Han et al. 2009), but these might not be enough to compensate for the nuisances the people living near the turbines have to bear. On the other hand, it is necessary to approach community benefits cautiously and with strategy as early in the process as possible, otherwise it could be seen as buying consent and will raise suspicions of how big the profits from this wind project might be for project proponents and investors, (Aitken 2010; Geissmann 2010).

6.1.2 The issue of distributional justice in the social acceptance discussion

The importance of distributional justice may vary for different regions or under different circumstances. Perception of distributional justice depends on the region; one model to increase social acceptance might not work everywhere. Additionally, distributional justice \ by itself is not a guarantee of social acceptance. It cannot substitute for a process that is perceived as fair (Devine-Wright 2007; Haley 2009). Distributional justice has sometimes been given up as an argument because other arguments seemed more efficient, e.g. bird fatalities (Solli 2010). In other locations, distributional justice did not seem the main concern, but measures in this area helped to mitigate other negative impacts of a project (DiBlasio-Brochard et al. 2010).

The idea of involving the local population as investors for increasing local acceptance of a project has been voiced by several parties. With this approach, the feeling of the local people towards the project can change: On one side, there is "local control" (Feurtey et al. 2008), on the other side, the feeling of "strangeness" of the project will vanish and the project will become "one's own" (Hammarlund et al. 2004). It has been shown that economic interests foster social acceptance (Devine-Wright 2007; Whitford et al. 2008). Most of the following sections will therefore deal with community and citizen wind power.

Another strategy to tackle the question of distributional justice are property rights (ownership) of the wind such as institutionalized in Switzerland for hydro power (Geissmann 2010): Energy companies have to pay the communities where the river flows if they want to exploit the river for hydro power. This constitutes a “hydro investment payment” for using the resource.

6.2. Ownership models

6.2.1 Recent trends

The wind power industry was largely started by small manufacturers and motivated enthusiasts. Today wind power has developed into an billion dollar global industry, (Nielsen 2010). Especially with offshore wind, but also with the general trend towards large wind turbines and large wind farms, individual investment has become less important and partially also less feasible, because of transaction costs and capital requirements for example (Maruyama et al. 2007; Szarka 2007; Maruyama et al. 2008). Denmark illustrates this evolution: Approximately 40% of the wind turbines still belong to local wind turbine owners associations, but these are mostly older and smaller turbines. The majority of the turbines erected since 1995 are owned by commercial energy and other private companies (Nielsen 2010). On the other hand, many authors have written about large-scale wind developments owned and planned by outside investors having more problems to acquire acceptance. Because there are locations where big deployments are not feasible, e.g. due to profitability or geographical constraints, there will always be a niche for small-scale wind owned by individuals or communities (Szarka 2007).

6.2.2. The role of communities

The involvement of municipalities differs in the countries: Feurtey et al. (2008) remarked for Canada that possibilities for involvement of municipalities depend on the countries` legislation. It is also a decision that is not always straightforward for the council members as the investment is done with individual’s capital. In Spain, public-private partnerships have been described as one of the main factors for Spain’s wind success (Dinica 2008). Municipalities for example have the chance to go into an agreement with developers and become a facilitator of the project (Zografos and Martínez-Alier 2009).

6.2.3 Overview ownership models

There are several overviews from the countries investigated that reveal a wide variety of ownership models and structures (Stadlober and Hahn 1999; Renewable Energy Partnership 2004; Devine-Wright 2007; Walker 2008; Devine-Wright and Devine-Wright 2009; Gipe 2009). The most important ownership model discussed in the context of local acceptance is community wind. For the following sequences, “community wind” is used as term for all ownership models describing involvement of individuals, groups of individuals and municipalities.

6.2.4 Community wind

Several articles discuss community wind, including definitions, advantages and disadvantages as well as additional benefits generated through the involvement of larger parts of the people (Toke 2005; Shoemaker and Brekken 2006; Maruyama et al. 2007; Maruyama et al. 2008; Walker 2008; Barry and Chapman 2009; DWTA 2009; OSEA 2010).

Apart from Denmark (Danish Wind Turbine Owners' Association 2009), there is a strong tradition for this model in Germany, Japan and to some extent in United States and Canada. Projects and studies from other countries show a growing interest in community ownership as well - the results of Warren and McFadyen (2010) from a survey in Scotland "support the contention that a change of development model towards community ownership could have a positive effect on public attitudes towards windfarm developments in Scotland."

The benefits of financial involvement especially on acceptance seem to have been widely recognized and there are ongoing efforts to increase community wind projects: In Denmark, recent legislation has introduced incentives with amongst others a local option for share purchase to increase local involvement (Denmark 2009; Nielsen 2010). In Canada, there are several projects that can be mentioned: The Community Power Fund in Ontario together with a feed-in tariff (OPA 2009), a call for tender by Hydro Québec (2009) or the Prince Edward Island's energy savings bond program (PEI 2007). On the other hand, the reality still shows the majority of the capacity being in the hands of private profit-making companies (DiBlasio-Brochard et al. 2010).

Practical experience from planners and investors suggest the model of cooperatives with low participation thresholds as a successful model especially for areas where pay back is a long-term issue. It is a method to enable financial participation and ownership for those that live in structurally weak areas (Neddermann et al. 2009). In Switzerland, the first citizen wind turbines have shown the interest of individuals to invest in the technology – there are over 600 shareholders. But the threshold has to be quite low where participation of the local inhabitants is wanted as the financial constrictions in these areas might be heavy.

Projects of various countries shall be presented shortly to illustrate some of the above mentioned:

- In Japan, "Community Wind Power" shows a tradition of incentivizing individuals to invest in wind power – from the host communities as well as citizens from outside. It has motivated thousands of mostly ordinary citizens to support this renewable energy for varying reasons. While "outside" investors usually experience problems with social acceptance, in this instance a relationship was created among the community, the investors, and additional economic impact generated for the communities by involving the investors in wind turbine activities. For example, to celebrate the end of construction, names were inscribed on the tower (Maruyama et al. 2007; Maruyama et al. 2008).
- In Germany, the project "Shared Ownership as a Means to Create Acceptance for Renewable Energies" (Nolting et al. 2010) addresses approaches to financially involve a broad spectrum of local and regional actors in the construction and operation of renewable energy plants. Concepts and processes shall be developed to efficiently involve large number of actors, e.g. concerning transaction costs.
- In the United States, a focus has been set on wind in schools and universities. For example, Wind Powering America's Wind for Schools Project has helped the installation of small wind turbines in schools with many accompanying profits for the schools, students, and communities. The states play an important role in facilitating this kind of renewable energy investment (Lantz (ed.) and Flowers (ed.) 2010).

- To make efficient use of the federal tax benefits in the United States, many wind project developers are partnering with third-party "tax equity" investors, who profit by sheltering their own taxable income derived from core business operations. This symbiotic relationship is known as the "partnership flip structure" (Bolinger et al. 2009; Bolinger 2010). The partnership is often based in states other than the project location state and usually receives the project's profit while the host community earns the "operating expenses" (usually much less than the profits). The terms "profit exodus" and "absentee ownership" describe the impact on acceptance of such projects. Alternative models involve local investors as the third party or spread the ownership widely enough to minimize individual tax liability (Lantz (ed.) and Flowers (ed.) 2010).
- In Ireland, a successful wind turbine on a campus near Dublin has encouraged industrial customers to explore their own wind energy potential. A number of energy services companies now offer risk-free models for those providing suitable sites: The project is planned and accomplished by the energy service company. The customer receives the electricity at a rate guaranteed to be below the retail electricity rate for the period of the long-term contract. This model supports the competitiveness of Ireland's industry and seems promising, especially now that the grid application process is less onerous for auto-generators. However, no inflated feed-in tariff is available to incentivize investment by individuals or small business in micro turbines (McCarthy 2010).
- A Canadian study (St. Denis and Parker 2009) showed a growing number of communities work with community energy plans, thereby incorporating citizens' ideas and opinions and making them active stakeholders in energy production, delivery, and consumption. Renewable energy projects play only a small part in these plans (due to lack of information, low energy prices, etc.), but together with some ongoing initiatives, this might change soon (DiBlasio-Brochard et al. 2010).

6.3. Welfare

In the United States, there is a tradition of measuring the increased value from community wind ownership models (Costanti 2004; GAO 2004) and wind energy in general (Goldberg et al. 2004; Lantz 2008; Lantz and Tegen 2008; Reategui and Tegen 2008). An overview on their outcomes shows that community owned projects can increase construction period economic development impacts by as much as a factor of three with a long-term operations period impact increase by a factor of 1.8 by community wind. However, specific estimates also vary due to different ownership models – increased local equity results in increased local economic impacts (Lantz and Tegen 2009). Nevertheless, wind energy in general has been shown to be able to have significant economic benefits in rural regions and has been valuable in shaping state policy for renewable energy (Lantz (ed.) and Flowers (ed.) 2010). For an overview on the impact of wind energy and other renewable energies on the governmental finances, job creation etc. see for Canada (Taub 2010) and in Ireland (Deloitte and IWEA 2009). For an estimation of the employments of offshore wind energy, see CA-OWEE (2001).

In Finland, the impacts of wind power on local people's welfare seem to be quite minimal as there is no law and benefits depend on the developer (Koskinen and Laitinen 2010). From Ireland, people in communities with wind farms have been reported to be not as optimistic about job opportunities as are communities where wind farms are planned – local communities could

be more involved (SEI 2003) although the job opportunities tend to be specialized and as such are often sources outside of the community. In Ireland, finding experienced engineering and project development personnel has been cited as one of the challenges to reach the renewable energy targets. Information for secondary and third level education to raise awareness for employment opportunities in the wind industry will have to be taken up (Deloitte and IWEA 2009). In Japan, community power has not only activated thousands of people to invest in wind power, but has also created economic and moral values for both the people in the host community as well as the investors all over the country – for a thorough discussion of those additional benefits, the so called "cascading" or "ripple effects", see Chapter 8.

Another factor concerning welfare is the reduction of import dependence for fossil and nuclear resources. It offers also the possibility for lower and stable long-term energy costs (Deloitte and IWEA 2009).

Wind projects often take place in rural and remote locations – where people do not necessarily have access to many investment opportunities in the area and where therefore wind power can offer a window. Once grid access etc. is secured, it might even provide a safe way of saving (Renewable Energy Partnership 2004). As examples from China show, wind power is able to bring infrastructure to remote areas as well as to give the catering industry and the hotel sector a boost (Han et al. 2009).

7. Procedural Design

Wind farms change the landscape and the local ecosystems and therefore have impacts on the people living in the surroundings. The following chapter deals with questions of involvement and communication as well as with aspects of the influence of the local context for a specific project.

The following references on procedural design topics could be interesting in this context, but will not be discussed further:

- Justice in connection with prior beliefs and the influence of new information or events in the context of energy (Poortinga and Pidgeon 2004).
- Risk communication in connection with energy infrastructure and social acceptance (Slovic 1993; Wester-Herber 2004; Prades-López et al. 2008).
- A recent issue of Energy Policy featured a special section on the "role of trust in managing uncertainties in the transition to a sustainable energy economy" (Bellaby et al. 2010), covering questions of how to network and relate to effectively manage uncertainties on the way to a more sustainable energy regime.

7.1. The issue of wind energy project procedures

Many authors have voiced the necessity to include the affected people into the process and to try to acknowledge their legitimate attitudes and feelings. Otherwise, they might feel excluded and powerless (Zografos and Martínez-Alier 2009), as though they have no control what happens to their landscape (Lantz (ed.) and Flowers (ed.) 2010). The outcome might be perceived as not

fully legitimated (Stadlober and Hahn 1999) or unfair (Gross 2007). The sense of justice on different levels, individual as well as local or regional, is crucial within the underlying cognitive and emotional variables concerning the acceptance formation process towards renewable energies (Hübner et al. 2010).

The following exemplary studies may illustrate these findings:

Dimitropoulos and Kontoleon (2009) found siting and institutional factors to matter more than the physical attributes of the wind farms. Similarly, Graham et al. (2009) highlighted the importance of factors such as place and identity processes, the perception of the developer, public participation and consultation. Gross (2007) pointed out that "perceptions of fairness do influence how people perceive the legitimacy of the outcome, and that a fairer process will increase acceptance" and that "different sections of a community are likely to be influenced by different aspects of justice, namely by outcome fairness, outcome favorability and process fairness."

(Breukers and Wolsink 2007) introduced the concept of "institutional capacity building" that describes the facilitation of open policy and decision-making processes at different levels providing access to relevant stakeholders and a variety of knowledge building to enter them. Project planning that encompasses local ownership and institutionalizes participation might help towards a better recognition and involvement of the multiple interests of the local environment.

A further possibility to involve the communities is to engage in the local affairs through participation in community festivals, offering guided tours etc. (Hübner et al. 2010). Lantz (ed.) and Flowers (ed.) (2010) list possibilities to increase confidence in a wind deployment, amongst others visits to working wind farms including interviews of neighbors, sound and landscape modeling, generous setbacks, and screening measures.

7.1.1 Legal instruments

Policy has frequently been implemented to address some of these procedural claims and has integrated a minimum level of consultation as part of the Environmental Impact Assessment. In the European Union, information and involvement in environmental issues are also provided by European Parliament and Council (2003).

The legal instruments to the affected people to make themselves heard during the planning and decision process vary between countries and therefore have different potential to cause project delays (Geissmann 2010; Walker et al. 2010). Stadlober and Hahn (1999) pointed out the effect of lengthy negotiations and conflicts involving discussions on the regional and national level. Delays as well as time pressure have the potential to raise uncertainty and doubts. Participatory processes might sometimes be able to diminish legal measures (Schmid and Schuppli 2009). Such an example has been provided by Wolsink (2010): Environmentalists opposing a near-shore development even believed that there are suitable sites for wind turbines in the respective sensitive area – but a highly technocratic, top-down process and layout had not taken account of the landscape preferences of the public.

7.1.2 Planning and decision processes

The German project "Acceptance of Renewable Energies and Socio-scientific Questions" (Schweizer-Ries et al. 2008) showed the need for a transparent and fair planning process as a whole with communication being directed towards all social levels. On the other hand, a lack of knowledge and information illustrates the need for a strategic concept of knowledge and know-how transfer (Schweizer-Ries et al. 2008).

The importance of coordination of local planning regimes has been highlighted by Khan (2003) who exemplified the inefficiencies of outcome and the differences in siting, involvement and ownership. As highlighted by the situation in several countries, a streamlining of the interpretation especially on the regional and local level is necessary to increase the equality of the processes. In the U.S., some municipalities, counties or states have already made use of their possibility to effectively prohibit wind power from their land by restrictive ordinances (Broehl 2010; Lantz (ed.) and Flowers (ed.) 2010).
One example for such an approach is the Danish initiative "The Wind Turbine Secretariat" that assists the municipalities with their planning processes (DWTS 2010). Japanese cases show that there might even be the necessity to make certain procedures obligatory as cost and time that the developers put into consensus building varies (Maruyama 2010). Concrete methods for consensus building seem not to have been discussed in Japan yet, while activities for information sharing among various stakeholders have been promoted with the aim of providing a platform for social dialogue (ISEP). The Japanese situation is complicated further because utility interconnection is sometimes decided by lottery which makes careful consensus building difficult (Maruyama 2010).

For China, Han et al. (2009) pointed out a lack of communication between developers and the local population, which was mostly due to local governments not having enough influence on the establishment of wind farms.

Baba et al. (2005) have investigated the topic of agenda setting. A step-by-step procedure is suggested to go from general to specific topics for the respective wind deployment.

A more theoretical input on centralized versus decentralized and about hierarchical versus locally based decision-making has been given by Cowell (2007). See also Chapter 3 for this issue.

7.1.3 Inputs for the industry

Many guidelines for the industry highlight consultation and participation (see also Chapter 8). Industry participants have acknowledged that a large-scale and sustainable wind development is only feasible when the wind industry is ready to invest in social acceptance and to reduce conflict potential (Lantz (ed.) and Flowers (ed.) 2010; McCarthy 2010), also because perception of today's processes shapes the reaction to tomorrow's projects (BMU 2007; EWEA 2009).

BBC Research & Consulting (2005) required the developers to remain flexible and adaptable through the development process, and van der Loo in Hammarlund et al. (2004) asked to be open about the outcome, which enables a negotiation about the details of the project. A pragmatic disposition of all participants, the will to find a sustainable solution, as well as a high interdependence help the process (Schmid and Schuppli 2009).

Walker et al. (2010) wrote about the necessity to understand the social context and to be aware of a simplistic prescription of what works – even community projects cannot just be replicated. On the other hand, when part of the purpose is to encourage a wider awareness for renewables, sustainable energy production, and consumption decisions, a more positive environment for large-scale transition of the energy systems can be created. Barry et al. (2008) and Aitken (2010) discuss the possibility of mutual learning and good compromises that are enabled by open and discursive processes when the opposition is not seen as a "pathology" or something to be cured but as a valuable input for the improvement of the project. Lantz (ed.) and Flowers (ed.) (2010) mention examples of approaches, such as a multi-stakeholder process to enable significant wind energy development while minimizing environmental impacts.

But there are limits to collaborative approaches in the case of value-based, fundamental opposition, e.g. concerning landscape: There, the answer to "How could we do this best?" is "No, we do not want the turbines." (Toke et al. 2008); see also Strub and Ziegler (2009) and Geissmann (2010).

7.1.4 The role of social networks

Social networks play an important role in gaining of social acceptance in a community. Planning can be advanced by locals activating their network (Toke 2005). Mc Laren Loring (2007) wrote about the role of high-level participatory planning to support the formation of a stable supporting network. In the United States, "champions" from within the community are informed about wind energy and activated to promote the project. The instrument of activation from within might also help to motivate people who are reluctant to being committed to participation in the process. Baba and Tagashira (2009) emphasized the importance of consensus building through participation in this context, but found that not everyone was willing to do this.

Lantz (ed.) and Flowers (ed.) (2010) highlight the importance of social networks in connection with "message fatigue" in today's information overload. Good information is important in the first stage and when the initial plans are presented (Øverås 2009). Additionally, credibility should be considered, which might be achieved by people from the community and credible third-party voices from outside. Jegen (2008) wrote about the moment of first information: It is to be given as early as possible not to overrule the affected people, but not before a minimum level of certainty about the feasibility and plausibility is there. Additionally, it should be prevented that actors are played off against each other.

The installation should also not mark the end-point of the efforts – investigation on efforts on property values, individual concerns etc. should be proposed from the start, especially where cumulative impacts from multiple wind farms may become an issue (Lantz (ed.) and Flowers (ed.) 2010).

7.1.5 Closure

The section shall be concluded with some of the results from the project Create Acceptance (2008) that confirmed observations from previous empirical and review studies and concluded on characteristics of socially acceptable projects. They tend to:

- be locally embedded
- provide local benefits (see also creation of win-win-situations by the widespread and fair distribution of gains (Schmid and Schuppli 2009))
- establish continuity with existing physical, social, and cognitive structures
- apply good communication and participation procedures (see also negotiations informed by respect and estimation of the other side, discussion on the same level (Strub and Ziegler 2009)
- have the capacity to leverage their social support to overcome difficulties in financing, policy instability, or lacking market power to produce the desired techno-economic outcomes, in addition to creating societal acceptance.

The project also summarized challenges encountered when introducing new energy technologies in a manner that promotes social acceptance:

- Introducing appropriate projects in appropriate contexts
- Identifying critical issues and stakeholders for evolving technologies
- Reflecting on action at appropriate stages
- Interacting with the "right people" in the "right way"
- Combining successful processes with successful outcomes
- Discussing stakeholder involvement and societal acceptance.

7.2. Communication strategies and public consultation

The following section brings together some studies and results in the context of communication strategies and consultation in wind energy projects:

- If a communication strategy considers issues such as benefits of wind turbines in connection with climate change and air pollution as well as local ecosystems and landscapes, the wind energy project can become a topic of conversation in the community and bring environmental awareness to the residents (Baba and Tagashira 2007).
- Baba et al. (2005) recommend starting the discussion with generalities and important points and adding details gradually.
- A community contact point should be established as an important communication strategy (Feurtey et al. 2008, Jegen 2008, Schmid and Schuppli 2009). The role of a neutral intermediary has been highlighted in several documented projects (Feurtey et al. 2008).
- A study of technology cooperation for renewable energies in Mexico (Mallett 2007), supported by findings from Spain (Dinica 2008), concluded that versions of technology cooperation consisting of public-private partnerships including the academic sector were most effective in eliciting social acceptance. High levels of consistent communication were mentioned further to boost social acceptance.
- Lantz (ed.) and Flowers (ed.) (2010) suggested that providing the public with an enhanced understanding of wind power technology and the comparative benefits and flaws compared to other energy production technologies and the possible benefits of the host communities could help communities to come to informed decisions. Trusted messengers

such as friends and neighbors who will not be paid for their opinion play an important role in this context.

- Lantz (ed.) and Flowers (ed.) (2010) propose possible avenues for communication between the various stakeholders as a place for information exchange and to develop a common understanding and educational materials and other creative ways to address common issues of people in the region.
- A study from Ireland shows that even if not everyone is consulted directly, satisfaction with the process can be high. The criticism raised however concerned lack of direct community involvement, lacking opportunity to give input on wind farm design and layout and the lacking opportunity for investment (SEI 2003).
- A "Code of conduct" on one hand for the wind energy sector including investors, developers and environmental organizations, on the other hand for actors on the project level leading to guidelines how to proceed and interact is being elaborated in Switzerland (Strub and Ziegler 2009; Geissmann 2010).
- In Germany, repowering has started much slower than expected. A repowering dialogue started to bring stakeholders into contact and to conclude with repowering guidelines. A consultation centre has been installed in summer 2010 as the need for consultancy has been voiced (Neddermann et al. 2009; Windenergie Agentur Bremerhaven 2009).

7.3. Cultural relationship and local context

The introduction to procedural design and justice has already mentioned the necessity to get to know the local context of a wind project, to get to know the concerns of the people. Walker et al. (2010) have pointed out the necessity to understand the social context when proposing projects – this is even valid for community projects, they cannot "simply be replicated from place to place."

The following examples and citations specific for the context of wind energy and culture, wind energy and landscape, wind energy and local structures shall illustrate these findings:

- Solli (2010) showed that sea eagles and the Dunlin have culturally different connotations in the Norwegian regions and that these have been used differently by local actors and national bodies of environmental management – in search for arguments they were adopted to local concerns, to the argumentation of the national bodies, and to the events in the procedural processes.
- There are important minorities in the various countries that have their own livelihood and traditions that might be influenced by wind installations. In Lapland, reindeer herding is of importance for living (Koskinen and Laitinen 2010). In Australia, the indigenous heritage should be considered (auswind 2006; EPHC 2008), while in the United States, a Native American tribe has been roped into the conflict of the Cape Wind debate (Broehl 2010). In Japan, landscape became most disputed when a compromise had to be found with the historical and cultural background had of a specific landscape (Association for Transmitting Izumo Culture ; Maruyama 2010).
- Differences between regions concerning attitudes towards wind energy or renewable energies in general have been documented (Kaldellis 2005; Meyer and Steinbiss 2008). While Dienel et al. (2008) describe the relation between social acceptance of renewable

energies and the energy history of the region, Stadlober and Hahn (1999), Jegen (2008) or Ott et al. (2008) and others put the focus on the social preconditions that have to be taken into account, e.g. divides in the community, hierarchical structures, regulations etc. Juraku (2008) emphasized the vulnerability of the balance of interests around wind installation solutions – the process design should be based on a thorough understanding of the local situation.[11]

The project Create Acceptance (2008) found that "the previous literature and statistics pointed to some regional, national and local differences in the uptake and acceptance of new energy technologies, including ones that are not fully explained by differences in natural endowments. These differences are not, however, due to inherent characteristics of different nationalities, or even fully explicable in terms of individual policy instruments. They are the result of a co-evolution of new technologies, their institutional contexts, and social action and meaning. One important component in this co-evolution is the way in which individual new technology projects interact with their local historical, cultural, institutional, social, economic, material and geographical context. Thus, societal acceptance is not necessarily an issue of accepting or rejecting a specific technology, but rather pertains to the way in which the technology is introduced in a new context. Important features influencing the process include the policy, economic, social, cultural and infrastructural conditions existing in different locations, as well as the timing of projects vis-à-vis changing framework conditions. New energy technologies are not merely energy or environmental issues, but also local political issues, housing issues, rural and economic development issues, and issues related to the adoption of new technologies; social acceptance should be investigated in local, institutional and historical context."

8. Implementation Strategies

Imagine being a developer at a public hearing, trying to convince people of your project, and you have to face a well-organized, highly committed, and "noisy" opposition. Or you are a local council leader trying to prepare the dossier for the discussion on a proposed wind project in your community. In both cases, you have to be informed about as many aspects of the technology and the project as possible and you need good material to help people understand on the characteristics of the projects. You have to develop an effective and truthful campaign and proven tools and techniques will help you to represent the wind energy deployment process and its benefits (adapted from Lantz (ed.) and Flowers (ed.) (2010)). This portion of the report therefore discusses specific methodologies for developing an effective and accurate means of communicating and implementing projects.

8.1. Visualization

As visible impacts are one of the biggest issues raised around wind energy developments, visualization is a must (Meyer and Steinbiss 2008). It might show people that while there are changes to happen in the landscape, harmony is still preserved and the wind farm will take up the

[11] See also Sections 4.2 and 4.3 for this topic.

characteristics of the landscape. Visualization has already become part of many Environmental Impact Assessments (DoEHLG 2006; Koskinen and Laitinen 2010).

Tools available for the aesthetic analysis include (from Lantz (ed.) and Flowers (ed.) (2010):

- **Photographic simulations:** Photographic simulations are a simple and cost-effective tool to illustrate the degree and character of project visibility.
- **Static image animations:** Static image animations allow digitally modeled turbines to include rotor movement and flashing aviation obstruction lighting. Utilizing this tool, one can depict the moving characteristics inherent to a wind project.
- **Drive-through animations:** Contemporary digital applications allow fully animated drive-through simulations along defined project routes, such as local roadways. In addition, other applications enhance 3D visualization to allow real-time virtual reality perspectives.
- **Video compositing:** Video compositing is a cutting-edge and highly cost-effective technology combining moving video and 3D project simulations. Video compositing illustrates a highly detailed spatial relationship, allowing the public to easily visualize the project within its context.
- **Visual impact assessment reports:** Preparing a visual impact assessment report early in the planning process provides a developer or planning organization with factual information to address predicted public concerns before community outreach begins.

A simulation tool is presently being developed in Japan (Ariga 2005). A framework based on GIS has been developed to forecast acceptability based on an analysis using different criteria such as human and environmental impact factors (Rodman and Meentemeyer 2006). An interactive visualization system has been proposed by the Fraunhofer Institute as a visualization platform (IFF 2008). In the United States, visualization in practice is dealt with among others by Matthew Allen and Jeremy Firestone (Firestone and Kempton 2007; Allen 2009; Allen 2009; Firestone et al. 2009). Meyerhoff et al. (2010) pointed out the need to further investigate the use of photos so that no wrong impressions are given that could bias the survey results.

8.2. Communication strategies and campaigns, social marketing

Koskinen and Laitinen (2010) propose a pronounced use of all the benefits involved for locals in marketing strategies. On the other hand, effects on environment or wildlife should not be downplayed – it will only slow down the project advancement. This is underlined by Lantz (ed.) and Flowers (ed.) (2010) who suggest that when communities fully understand the benefits of the project (wind or transmission lines) alongside its costs, they usually choose to move forward. In this context, Schlegel and Bausch (2007) and van der Loo in Hammarlund et al. (2004) suggest new ways of making people see renewable energies, e.g. by providing positive experiences with wind farms: “If people believe a wind turbine is not effective because it does not produce electricity in a no-wind situation, it might make a difference if you inform them that a turbine still produces enough power for 700 households.”

An important issue for the future is careful press coordination, not only with traditional media such as print or TV, but also concerning internet articles, Facebook, Twitter etc. Today's handling of information and media might contribute to the importance of personal relations – they are often more trusted than official or sources of the industry. In the United States, some organizations have set up a system of "messengers". In public forums, the messengers get information about economic benefits, costs and liabilities and then pass the knowledge to people in their communities (Lantz (ed.) and Flowers (ed.) 2010).

Many authors have cited the need for communication, awareness, and education on the issues of renewable energy technologies, climate change, and related topics, and efforts are ongoing in many of the participating countries. Some examples of programmes and projects are:

- In Japan, a simulation game has been developed that deals with finding solutions for environmental disputes on wind power siting (Baba and Matsuura 2008). A drawing contest, "Wind Turbine Landscape Contest," is supported by a newspaper, an electric power company, and the ministries responsible for wind development (Maruyama 2010).
- In the United States, the Wind for Schools Project installs small wind turbines at rural and elementary schools to provide a concrete and practical demonstration of wind energy, to allow students to integrate data from the turbine into their theoretical understanding of how it works, to provide a "hands-on" experience, as well as to offset the schools' electricity demands (Wind Powering America 2010).
- In Canada, the project Gen E by Enmax offers educational resources and has installed alternative sources of energy in some schools. The programme is intended to be expanded to the entire province (Enmax 2010).
- In Germany, the projects "powerado" and "powerado-plus" aim to create effective communication and education tools for renewable energies promotion to children, adolescents, multiplicators, and teachers (IZT 2009). The action programme "climate protection in schools and educational institutes" (BMU 2010) supports ideas and projects in schools that contribute to the reduction of CO_2 emissions. The "Leuchttour" introduces renewable energies and climate protection as an adventure to children between 5 and 10 years (Deutscher Kinderschutzbund and Homann Güner Blum 2008). Further initiatives include an exhibition ship touring the German coasts to foster social acceptance (Stiftung Offshore Windenergie 2009) and "Windkraft im Visier," a campaign to overcome the prejudice that nature conservation and wind energy have to conflict (DNR 2010).

Additionally, exchanges occur between experts and the public or between agencies and the industry or the public:

- In Japan, experts are sometimes invited to planned sites to answer questions from the public. On the other hand, manufacturers are invited to universities to give lectures (Maruyama 2010).
- In Australia, the wind industry and individuals have done most of the work on educating the public and raising community awareness with a rather modest role of the government (EPHC 2008).

- In Finland, the Ministry of Employment and Economy has financed some smaller educational projects to increase the knowledge on wind power among the general public and to improve social acceptance (Koskinen and Laitinen 2010).
- In the United States, the federal government and various non-governmental organizations are supporting material and project ideas to promote renewable energies while federal and state governments may offer or provide additional programmes along with incentives to support deployment of renewable energy technologies (Lantz (ed.) and Flowers (ed.) 2010).
- In Canada, material on renewables in general is available on science.gc.ca, including material from private companies (DiBlasio-Brochard et al. 2010).
- In Ireland, SEAI provides general information and engages with schools proactively via a schools programme and reactively on request. Additionally, SEAI and other state agencies inform planners and local officials on a wide range of renewable energy issues through seminars and national events (McCarthy 2010).
- In Switzerland the Wind Energy Association, in collaboration with the Federal Office of Energy, provides a website (Suisse Eole and Swiss Federal Office of Energy) with a wind map, a GIS based planning tool, statistical data and other wind-energy related information (Geissmann 2010).

Hübner et al. (2010) have provided many German examples of communication campaigns and projects to tackle acceptance issues (Forum Netzintegration Erneuerbare Energien 2009)[12], but in their opinion, coherent strategies or a social marketing approach are missing. Lantz (ed.) and Flowers (ed.) (2010) also suggest broad based education efforts at the level of the general public and project specific efforts, organization of the silent majority, and informing the citizens at the community level.

8.3. Existing checklists and guidelines

There is a wide range of available documents telling you how to navigate in your role in the wind business – be it as authority, developer, community group or environmental organization. Social acceptance is addressed in the majority of the guidelines or best practices with a special emphasis on consultation. It is interesting to note that in this selection, community wind guidelines only come from English-speaking countries, while guidelines for authorities and developers can be found everywhere. There are more general guidelines on the whole planning process, as well as more specific guidelines such as on determination of setbacks or re-powering.

8.3.1 Guidelines for institutions and authorities

Europe

- National spatial planning guidelines, in 2008, information of building wind power (Koskinen and Laitinen 2010) (Finland)
- Repowering of wind turbines – guidance for local authorities (Neddermann et al. 2009) (Germany)

[12] See also Chapter 4 (Educators).

- Planning Guidelines for Local Authorities on Wind Energy Development (DoEHLG 2006) (Ireland)
- Guidelines for planning and localization of wind energy (T-1458), 2007 in (Solli 2010) (Norway)
- The Wind Energy Concept and its follow up; Recommendations for the planning of wind energy projects in Switzerland (Gilgen et al. 2010) (Switzerland)

North America

- Wind energy and social acceptance: Guidelines for local authorities in Québec (Feurtey et al. 2008) (Canada)
- Position on Setbacks for Large-Scale Wind Turbines in Rural Areas in Ontario (CANWEA 2007) (Canada)
- Permitting handbook (NWCC 2002) (United States)
- Examples of model ordinances and state guidelines (NYSERDA 2002; State of Pennsylvania 2006; State of Wisconsin 2007) (United States)

8.3.2 Guidelines for developers/producers

Europe

- European Best Practice Guidelines for wind energy development (EWEA 1999) (Europe)
- Den gode proces (Danmarks Naturfredningsforening et al. 2009) (Denmark)
- Best Practice Guidelines for the Irish Wind Energy Industry (IWEA 2008) (Ireland)
- Guidelines and checklists for investors (Ott et al. 2008; Ott et al. 2008; Ott et al. 2008) (Switzerland)

North America

- 11 steps of building include consultation (CANWEA 2008) (Canada)
- Best practices to prevent sound issues (HGC Engineering 2006) (Canada)
- AWEA Siting Handbook (AWEA 2008) (United States)

Others

- Best Practice Guidelines for implementation of wind energy projects (auswind 2006) (Australia)
- Guidebook on introducing wind power generation for wind power producers (NEDO 2008) (Japan)
- Manual for environmental impact assessments (NEDO 2003) (Japan)

8.3.3 Guidelines for community projects

- Community Renewable Energy Toolkit (Community Energy Scotland Limited 2009) (UK)
- Bankable Models which Enable Local Community Wind Farm (TLT Solicitors 2007) Ownership (UK)
- To catch the wind: The potential for Community Ownership of Wind Farms (Renewable Energy Partnership 2004) (Ireland)
- Wind energy basics: a guide to home- and community-scale wind energy systems (Gipe 2009) (United States)

General

- National Wind Farm Development Guidelines (draft) (EPHC 2009) (Australia)
- The Protocol for Public Engagement with Proposed Wind Energy Developments (Centre for Sustainable Energy et al. 2007) (England / Wales)
- Security of Wind Energy Installations (Rigassi et al. 2005) (Switzerland)
- Best Practice Guidelines: Consultation for offshore wind energy developments (BWEA 2002) (UK)
- Wind Turbine Guidelines Advisory Committee (Fish & wildlife) (WTGAC 2010) (United States)
- Virginia Wind Energy Collaborative (James Madison University 2009) (United States)

8.4. Scientific results and practical application

This section presents aspects of the application of scientific research. There are many analyses and documentations of actual projects with indications of best practice such as:

- Analysis of four case studies in Switzerland (Schmid and Schuppli 2009)
- Identification of barriers for renewable energies and strategies to overcome them from Germany (Keppler and Töpfer 2006; Schlegel and Bausch 2007; Dienel et al. 2008)
- Description of a best-practice project in Canada (Feurtey et al. 2008)
- Analysis of community wind projects in Japan (Maruyama et al. 2007)
- Sociological investigation of Danish offshore projects (ECON Analysis 2005; Kuehn (ed.) 2005)
- Comparison of social dynamics around a wind and a transmission line project in Canada (Lyrette and Trépanier 2004)
- U.S. case studies (NWCC 2002).

Integration of wind power into the grid and effects on regulating power are being discussed in many countries. Koskinen and Laitinen (2010) point out the importance of studies on these topics to rule out skepticism.

A research project in Norway deals with the knowledge generation in exchange with society (Øverås 2009). While research usually produces results and then decides on what to do with it, this project fosters the contact between society and researchers to produce relevant knowledge

for policies that take implementation issues into account from the beginning and its implementation in an applicatory context. The researchers have the hope to be heard while society wants to solve problems such as the collision of birds with wind turbines.
Likewise, Ram (2008) is working on an integrated risk assessment for large wind deployments where a consistent program of research collects relevant data for all areas connected with risks around wind farms to find acceptable risks and to enable informed decisions.

Create Acceptance (2008) found that debates around technologies depend on the maturity of the technology – for less mature technologies, general public and acceptance of environmental organizations are in the focus while for more mature technologies, the concrete function of the technology and the local impacts are in the center of the attention. Acceptance by policy-makers was relevant in practically all case study projects.

8.5. Cascading effects

There are obvious and directly visible benefits to wind turbines such as the payments to the landowners or CO_2 reductions. But there is a chance to harvest many indirect benefits for the local communities ("ripple effects"):

In Japan, investors received issuing certificates, could inscribe a name on the turbine or participate at a wind turbine tour. These attempts added value to the investment and motivated investors to take action (Nishikido and Maruyama 2006).

By inviting investors from outside the region and asking them, for example, to participate in the celebration of the completion of the turbine, a human exchange was created which brought immaterial values such as awareness raising or sense of the community to those involved, but also benefits to the local economy. When investors come to visit, they spend money in the community. There are also examples of funds for town development (Maruyama et al. 2007).

In the United States (Lantz (ed.) and Flowers (ed.) 2010), increased economic activity was registered through additional income for landowners and operations and maintenance personnel and these persons subsequently spend a portion of this new income the with local retailers and service providers. In addition, property tax revenues to the communities help to finance schools and infrastructure.

Renewable energy projects also reduce dependence on fossil resources and imports which is a driver for wind energy development in e.g. the United States (Lantz (ed.) and Flowers (ed.) 2010).

In China, wind development brought infrastructure to rather remote communities and helped to establish the hotel business and the catering industry (Han et al. 2009).

Part IV: Summary and Conclusions

9. Key Conclusions/Recommendations

The previous parts have given a picture of what we know today about social acceptance of wind energy and have pointed out some open gaps where further research is needed. By analyzing a wide range of studies, this report focused on the understanding of social acceptance gained in the literature. The work looked at how social acceptance is influenced and how it can be fostered. This work on the various aspects of social acceptance has highlighted the linkages between sections and the issues described. The following chapter will try to summarize this knowledge by structuring it along the questions of "Where do we stand?", "What do we know?" (cross-country analysis), "What do we need to know?" (further research), and "What do we have to do?" (implementation issues).

9.1. Where do we stand? Social acceptance of wind energy projects

Knowledge on social acceptance of energy technologies has been built up for decades. It includes public reactions to nuclear, biomass, and hydropower projects. In the case of wind energy, research and experience in the area of social acceptance of infrastructure projects such as waste handling, traffic, or airports have provided useful inputs as well.

Experience has shown that there are real concerns to be taken into account, emotions and values are at stake, and every situation is different because there are local structures, characteristics, and histories to respect. Some of the key issues for social acceptance of wind energy projects are:

Socio-political acceptance

- **Policy and regulation**: Wind energy policy, renewable energy strategies, spatial planning, siting decisions, and financial incentive programs can have direct and indirect effects on social acceptance and are influenced by socio-political acceptance discussions as well.
- **Wind energy in forests**: Discussions on the acceptance of wind farms in forests have become more prominent recently. There is no consensus yet about what wind development is acceptable in forests, taking into account the value of forests in the different countries.
- **Transmission lines and grid expansion**: Transmission lines and other infrastructure questions are not separable from wind power deployment. Awareness of this connection must be raised, but it seems that benefits distribution is more difficult for transmission lines than for the wind farms.

Community acceptance

- **Quality of life**: Concerns over negative health impacts due to annoyance and stress related to noise, low-frequency sound, shadow flicker, or obstruction markings for the people living in the area surrounding the turbines have raised vivid debates about wind farm planning.

- **Standard of living and property values**: There are concerns over negative impacts on real estate values. On the other hand, there are positive effects on regional development, such as additional income and jobs created in the region.
- **Landscape and ecosystem**: While wind power does help to reduce CO_2 emissions and to diversify the energy mix, changes in the landscape and effects on the local ecosystems have to be openly discussed, weighed, and minimized. Issues of landscape and ecosystems are discussed for onshore as well as offshore but with varying characteristics and argumentations.

Market acceptance

- **Distributional and procedural justice**: Opposition should not be discarded as stupid, bad or wrong and information and consultation should not be handled carelessly. Developers, planners and investors should on the contrary incorporate the locals and create win-win-situations to prevent a deepening of the conflicts.

Most of these issues have been observed in many of the participating countries as well as in those included through literature analysis. However, the characteristics of the discussion and the weight of the different arguments have varied among countries. Some examples shall be given here: While landscape has probably been the main issue in many European wind power discussions, it has been one among many other topics in Japan. The question of impacts on birds has been debated in more or less all countries, while for example effects of low-frequency sound are reported mostly from Japan and Canada. In Ireland, there are strong “pylon pressure groups” opposed to new transmission lines in their area, but there is no national organization opposing wind developments. In Switzerland, on the other hand, a national landscape protection organization is attempting to prevent all wind development in the country. In many European countries and the European Union, there are efforts on harmonization of regulations and implementation processes, the United States and Canada still rely heavily on state / regional efforts for the achievement of the targets.

IEA Wind Task 28 has initiated a cross-country and interdisciplinary exchange aiming at a comprehensive understanding of social acceptance of wind energy. Learning from each other and direct comparison of experiences have proven valuable to gain an overview on the complex issue and on the strategies that have already been applied in different countries and disciplines.

The work of IEA Wind Task 28 has so far included mostly highly industrialized countries. As renewable energy technologies gain momentum in many developing and emerging countries in the next few years, the issues discussed in this report may become important in more countries with different characteristics. IEA Wind Task 28 working group members would therefore be interested in exchange with additional countries. An extension of the task work plan with the inclusion of emerging and developing countries such as Brazil, China, India, Russia, eastern European countries, and others might provide new insights and additional gains for all countries involved.

9.2. What we know

Stakeholders and the various groups involved in wind energy discussions have been questioned concerning their attitudes towards renewable energies in general and wind energy specifically. Research projects have attempted to analyze the interest groups involved in wind energy planning and implementation such as to understand their position and role in the discussion. The triangle model by Wüstenhagen et al. (see Chapter 2) attempted to structure the discussion along the three dimensions "socio-political acceptance", "community acceptance" and "market acceptance" and to give guidance on how to approach the discussion with the various stakeholders. While IEA Wind Task 28 profited from this previous work, the discussions however showed the importance of several groups not explicitly named in the model, such as institutions and media.

The country reports prepared by members of the working group of IEA Wind Task 28 provided an important input for this cross-country report. They collected the knowledge in the particular countries and drew a comprehensive picture of the situation and the interest groups involved that has not been accomplished at this level of detail previously. Together with in-depth discussions in the group, the country reports enabled an overview on the problems and strategies around social acceptance of wind energy projects.

Success factors for wind energy projects in terms of social acceptance have been distilled by analysis of case studies. Best practices guidelines for the industry or for the authorities have incorporated aspects of communication and consultation in the different stages of project management. Some of these guidelines also mention how to deal with quality of life issues or wildlife in the process of planning, building, and operation of a wind farm. Best practice literature has helped to make social acceptance an industry and involvement an authority topic.

9.2.1 Socio-political acceptance

The **general opinion** towards renewable energies and wind energy is positive. This picture from opinion polls and surveys shows the acknowledgement of the necessity to invest in renewable energy technologies. However, this understanding has to evolve into broader involvement of the affected public and the different authorities in the planning and decision process.

Policy makers have to realize that their task is not fulfilled by setting targets and quotas, not even with the establishment of a supporting financial framework. Social acceptance needs a follow-up and has to pervade the various institutions involved in wind energy planning and implementation:

- Wind energy does not only concern the energy and environmental departments - it has implications on infrastructure, cultural heritage, tourism, regional development etc. Coordination of all these interests has to take place between the departments on one level (national, state, local) and between the levels. This means a common understanding of priorities and measures to minimize compatibility problems; e.g., by means of a multi-stakeholder regional planning. One of the issues for such coordination is the overlapping of good wind conditions and a high value of a location for nature or culture. Solutions have to be found that are acceptable for large majorities, including discussions about the

understanding of nature conservation, the value of wind energy, and the weighing of interests.

- The implementation and interpretation of wind energy planning processes have often been left to regional and local authorities. Some examples are the conversion of general renewable energy targets into capacity targets for the various renewable energy technologies, handling of renewable energy and nature protection, participation and involvement procedures, and approval processes. This has resulted in many different approaches and processes, which is especially striking in countries with small-scale political divisions. A more homogeneous regional and local implementation in planning and approval processes, etc. could prevent inequality in the treatment of project proposals from one region to the other and would simplify planning and decision procedures for institutions, authorities, and developers.

The interest of the **media** for conflicts and arguments makes it easy for opponents of wind projects to catch the attention of journalists and therefore, media-effective actions have generated a lot of echo. Information technology allows anyone to broadcast their content and opinion. Trust and confidence have become a precious good; they have to be sought and won, which increases the value of social networks and personal contacts.

9.2.2 Community acceptance

Deepened investigation of the **communities** concerned by wind energy projects has shown the complexity of the discussion on the local level. “The community” contains many different interest groups and each location has its own story, its own structure, and its own experiences that influence reaction to a wind energy project. There are deep emotions and values attached to the sea, landscape, and the ecosystems that have to be taken seriously. With today’s knowledge and technologies, much of the historical impacts of wind development on quality of life as well as on the environment can be minimized and mitigated. But perception of annoyance and the emotions attached to the landscape have an individual component that cannot be neglected.

While the negative impacts of a wind farm are rather obvious to those affected, the benefits and gains are often not. This is because they accrue indirectly, such as regional development, or because they matter more on a national or international scale, such as the reduction of CO_2 emissions. The recognition of local impacts and the communication of the positive impacts require that benefits are as widespread as possible and that the affected people get involved in planning and decision making as well as financial participation opportunities such as to make their inputs and concerns heard.

Municipalities and local communities usually take an imminently important role in the decision process while often having to deal with these questions for the first time. They need unbiased independent information and they need resources to take decisions for the best of their community considering all arguments around the wind farm.

9.2.3 Market acceptance

Developers and planners are dealing directly with the different interest groups – the institutions, the community, and environmental organizations. Inadequate behavior by some developers and project managers might have contributed to social acceptance problems around wind energy projects. A condescending treatment of the opposition and a careless handling of information and consultation provoke a tightening of the opposition arguments and a deepening of the conflicts. Opposition should not just be discarded as stupid, bad or wrong. Legitimate arguments and constructive inputs have the potential to improve a project to everyone's long-term benefit. As wind farms bring change to the living environment of people, these people have a right to speak their opinion and give their input on the project. Some companies involved have already realized that seeking shortcuts in planning processes will harm wind development in the long term. People have to welcome wind farms in their communities. It is not just about planning and technology; it is about sensitivity and intuition as well as know-how to create win-win-situations and to achieve a fair balancing of interests.

Utilities and grid owners have taken on various roles in the different countries. For example, in Switzerland where the feed-in tariff was introduced only lately, utilities are the most important actors in the field. In other countries such as Germany and Canada, utilities and / or grid owners opposed wind energy especially in the beginning with the argument of grid integration. In some U.S. states, the UK, Italy and Japan, utilities were forced by quotas to become actors in renewable energy technologies. Acceptance in the utility sector therefore is often of crucial importance for the development of wind energy.

Financial institutions are involved in some countries such as Japan or Germany, while in others such as Canada or Switzerland, factors such as risk or the economic performance have limited the role of these institutions. The regulatory framework, the stability of the market, and the importance of the wind sector for the whole economy seem to be the relevant factors for engagement of financial institutions in wind energy.

9.3. What we need to know: further research and what we need to do

The definition of social acceptance by Wüstenhagen, Wolsink and Bürer (Wüstenhagen et al. 2007) on which the structure of this report (see Chapter 2) was built is so far only one of several approaches for discussion of social acceptance. However, it would be desirable to have a generally accepted definition to facilitate approaches with the various stakeholders involved. This is in line with the call for a more integrative and interdisciplinary framework and a holistic and strategic approach for communication, knowledge building and impact / risk assessment. The cross-country and interdisciplinary exchange within IEA Wind Task 28 and the approach of this report to compile knowledge from several disciplines may be seen as first steps in this direction.

Enhanced exchange between social scientists on one hand and developers, planners and engineers on the other side will provide useful insights. Social scientists have to formulate their findings in a language other disciplines may be able to implement and get the financial resources to do so. Examples for such issues are:

- perception of fairness and justice, such as the impacts of participation on the process or a clear linkage between procedural and distributional justice for social acceptance
- reasons for opposition to projects in specific locations
- interactions between stakeholders
- change of attitudes from before the project's announcement until well after the project's construction and the factors behind these changes
- the impact of wind farms on quality of life.

Developers, investors, policy-makers, and authorities on the other hand have to accept the findings by social scientists even if they signify additional time and effort for the projects. It will be important to seek ways of integrating these findings into the work of developers, policy-makers, etc. for example by the realization of “best practice” projects in all countries.

There is much knowledge about how to deal with social acceptance questions within the wind industry, based on field-experience. However, it is not always easy to obtain this knowledge. Exchange and development of partnerships between industry, authorities, and researchers to tackle the issue of social acceptance could lead to a more open discussion. New approaches could be developed to strengthen and link the people supporting wind energy, therefore avoiding also the focus on the opposition and their arguments and broadening the involvement.

Experience has shown that acceptance is moderated by the feeling of influence on a development. There is the need for more democratic processes - the balance between top-down / bottom-up and between hierarchical and decentralized planning.

Financial participation by the ordinary citizen is one way of achieving involvement and influence, but it is getting more difficult due to the trend for large-scale wind developments. Hybrid ownership models have to be developed and a decrease in transaction costs has to be achieved in order to enable identification with and a sense of ownership even for large-scale projects and offshore developments.

Guidelines and manuals on how to set up a wind farm often include aspects of social acceptance (e.g., about how to inform and consult with the local community). There are also guidelines specifically on wind power, (e.g., on how to consider the various issues in the decision process, intended for local authorities, or how to organize a community wind power project). However, in-depth manuals on consensus-building and training that are developed for the people working at the forefront are rare. Additionally, the implementation of the guidelines has not been assessed yet. There are specific issues for each country, but often there are also common themes where learning from each other will be helpful and give social acceptance aspects more weight in the processes.

Knowledge gaps still exist concerning the impacts of wind farms on the quality of life, for example concerning noise and sound, long-term exposure, impacts on sleep physiology or the efficacy of setbacks. The same seems to be true concerning the environmental impacts, on specific species and their changed behavior, but also on the ecosystem as a whole. For

communication and argumentation however, it is important to be able to give concise and well-founded information.

9.4. Conclusions

Achieving the ambitious targets set by many states will presumably require large capacities of wind power to be built in the years to come. General acceptance of wind energy has been shown to be rather high which is mirrored in the growth of the wind industry and the increase in installed capacity in most countries. But social acceptance issues have to be considered with delicacy, preparing people for what is to come and involving them in the changes that are brought to their living environment. Otherwise, a lack of social acceptance has the potential to develop into a powerful barrier to wind deployment. Likewise, by increasing project risks and protracting the realization times for projects, low levels of social acceptance will increase wind energy development costs.

The discussions within IEA Wind Task 28 have shown the benefit of discussing social acceptance of wind energy in a cross-country and interdisciplinary context. The structure of Wüstenhagen, Wolsink and Bürer and the adjacent set-up of the structure of this report have contributed to a collection of the various aspects and issues involved in social acceptance of wind energy projects. The working group will therefore continue its work on “Good Practices” to help the implementation of today’s knowledge into practice on-site, thereby deepening the dialogue between social scientists, engineers, planners, and institutions.

The analysis of projects from many countries and discussion with researchers, planners and engineers has also highlighted that it is not possible to achieve 100% acceptance – there will always be people who oppose wind energy in general as well as specific projects. Proponents and developers also have to realize that acceptance is not a linear function. There is no certainty that if you follow a recommendation, there will be an acceptance of 80% or 100%. There is an emotional and an individual component that cannot be predicted. Therefore, the goal is to “win hearts and minds” and “turn affected people into involved parties” to get as much public support as possible by open dialogue, more democratic processes, and honest involvement. This requires a real commitment by the developers and proponents to accept inputs and critics as a way of improving the project and to fit the project to the surrounding landscape, the environment, and the people living with the turbines.

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