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Wind Power: the Basic Challenge concerning Social Acceptance
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Article Outline

Glossary

Attitude – Disposition to evaluate a psychological object –the attitude object –, representing a summary evaluation of this object captured in such attribute dimensions as good-bad, harmful-beneficial, pleasant-unpleasant, and likable-dislikable.

Attribute – Character ascribed to an attitude object about which an actor may hold a belief (expectancy) and an evaluation (value).

Collaborative planning – Planning with delegated responsibility to stakeholders who engage in interest-based negotiation about a plan or a project.

Community – A body of people viewed collectively; e.g. the local community surrounding a wind farm location or a community holding a collective interest.

Discourse – A shared way of apprehending the world; in this case reflecting how the environment (including wind power implementation) is interpreted and given meaning.

Innovation – A change of ideas, that becomes manifest in products, processes, or organizations, that are applied successfully in practice.

Institutions – Existing patterns of behaviour, determined by existing societal rules; "the rules of the game in a society".

Landscape – The part of the environment that is the human habitat as it is perceived and understood through the medium of our perceptions.

NIMBY – Depreciative interpretation and characterization of opposition to a facility: an attitude of objection to the siting of a facility in the proximity ("backyard"), while by implication raising no such objections to similar developments elsewhere; acronym of "not-in-my-back-yard".

Place identity – Human binding to the physical environment at a certain place or area; associated concepts: place attachment, sense of place.

Public acceptance – The degree to which a phenomenon is taken by the general public, the degree to which the phenomenon is liked by individual citizens.

REFIT – Renewable energy feed-in tariff, a class of financial procurement systems creating a priority market for renewable generated electricity by guaranteed access to the grid with a long term fixed price per kWh.

RPS – Renewable Portfolio Standards, a class of financial procurement systems based on certificates issued for renewable generated electricity–“green certificates” – with a legal quote for renewables creating a market for trading certificates.

Smart grid – Power grid consisting of a network of integrated micro-grids that can monitor and heal itself.

Social acceptance – The degree of which a phenomenon (e.g. wind power implementation) is taken by relevant social actors, based on the degree how the phenomenon is (dis-)liked by these actors.

Socio-technical system – A system be made up of scientific and technological, as well as socio-economic and organizational components.

1. Definition of the subject

Successful implementation of new technologies requires social acceptance. Historically, for the implementation of wind energy this was considered a relatively simple issue that

could be addressed by applying effective communication strategies. Without much study, social acceptance of wind power was considered a matter of merely public acceptance and any problems with public acceptance were viewed as issues of education. Furthermore, the public acceptance was primarily negatively defined, under the heading of 'non-technical factors' (1).

However, innovation must be considered a much broader concept, as there is nothing inevitable about how new technology is developed and implemented. The willingness to accept phenomena related to innovation of different parts of society, including all realms beyond 'the public', can be subdivided in two broad categories:

- Acceptance of the creation of new socio-economic conditions needed for implementation;
- Acceptance of the consequences of the implementation: implementation will affect current practices in society and forcing some to change.

The very limited number of first studies on acceptance in the eighties indeed focused upon public attitudes (1-4). One of the first observations also was that social acceptance studies should look at the conditions that determine the effective support that applications of wind power would get at all different levels of decision-making. The studies showed that neither public support, nor support from crucial stakeholders at varying scale-levels could be taken for granted. The pioneer of social acceptance studies, Carlman, observed that building wind turbines was “a matter of public, political, and regulatory acceptance”, and therefore she carried out a study on the acceptance of wind power among decision-makers (5, p.339). Her study suggested that there were several constraints for social acceptance beyond public acceptance.

Soon in the eighties other academics joined this approach and broadened the definition and analysis of the problematic issues for implementation (4, 6). These studies focused on issues such as the lack of support among key stakeholders –including the limited commitment of energy utilities– reluctance among policy makers to dedicate themselves to convincing policies, and the lack of understanding of the roots of attitudes towards wind power schemes among local residents and local communities.

Because implementation issues are much broader than public opinion with regards the application of the energy source 'wind', the nature of the studies has changed. The number of studies remained limited during the nineties, but a significant increase took place during the last decade. Many of these studies focused upon the level of decision-making about building wind farms, which is the crucial factor in the success rate of a country's wind power development. As the character of all these cases of building wind farms shows a wide variety, most of these studies are designed as single case studies. Beside those studies, some comparative case studies have been carried out to compare the differences between countries, and single cases that analysed the development of policies within a country.

The intensive study of social acceptance has a rather short history and the understanding of the issue is still limited (7). Only recently, a first effort to elaborate the concept of social acceptance of renewable energy innovation was made (8). Three distinguishing dimensions of the social acceptance of renewable energy innovations are now recognised, all with it's own character and dynamics: socio-political acceptance, with a focus on decisions that create favourable conditions for the other two forms of acceptance; community acceptance that concerns the decisions about the integration of wind power scheme at a certain location; and market acceptance, which is about willingness to invest among all different kinds of actors including wiliness to pay for wind generated power among consumers.

2. Introduction: four starting points

2.1 Socio-technical systems

Successful implementation of new technologies requires socio-political acceptance. The implementation of wind power is a form of innovation, as it implies the application a relatively new form of energy supply. By definition, innovation is the successful application of new ideas, transferred into products, processes, or organizations. The integration of new technologies such as wind power in society is not a matter of simply applying science; also there is a series of factors in the social environment that co-determine it: social, economic, cultural and different technological factors (9). Regarding wind power, these include the integration of this new way of generating power in the existing energy supply and consumption, as well as the appearance of modern wind turbines in our landscapes and as part of communities and local or regional economies.

In addition to technological concerns, the application of wind energy carries a strong socio-economic component. Significant scientific and technological challenges need to be overcome, but as history shows, well-developed science and technology are not sufficient to foster application of technologies. Making it affordable does not address the entire challenge; the society may fail to allot acceptable locations for the facilities or fail to deliver the required social and financial investments. This observation leads to *basic assumption I*:

> An energy system containing a substantial part of wind generated power and also a substantial part of wind generated energy consumption, should be considered a new socio-technical system (STS).

2.2 Acceptance of distinguishable aspects

A STS is a system with new scientific and technological as well as socio-economic and organizational components, which is reflecting new ideas and concepts on the proffered design of such new systems (10). A STS pays attention to the linkages between these two components, links that are necessary to fulfil societal functions (11). Such functions can be –among others– support of regional economies, provision of energy, reduction of environmental impact, etc. The development of distinguishable sub-functions of the new crucial technologies requires favourable institutional conditions and extensive social learning. This also holds for wind power (12; 13). Hence, the second *basic assumption (II)* states two things:

> All aspects of a new STS featuring a substantial amount of wind power are subject to social acceptance;
> An actor may accept certain aspects, while simultaneously rejecting other aspects, as a result of social, economic, and/or political learning processes.

In all domains, to be implemented innovations require institutional changes and careful strategic governance, especially when such innovations concern fundamental shifts in ways of thinking about the way the system is designed and how it should work (10).

2.3 Institutional change

For wind power, it is not only the technical novelties that are subject of acceptance, but rather the new ways of organizing the STS and how to take decisions about it that are required to build the turbines and to integrate their intermittent energy production into the system of energy supply and demand. In particular those new ways of organizing require new ways of thinking, which only emerge though processes of organizational and policy learning. Developing a STS requires the understanding of and

the will to change crucial 'rules of the game in a society', the short definition of *institutions* (14). Institutions are defined as mutually reinforcing patterns of behaviour and thinking (of actors of all levels), as reflected in formal and informal rules, norms and procedures. These patterns of thinking and behaviour can be recognized within all realms of society, including governance systems.

The way existing supply and demand of electrical power are shaped is full of patterns of behaviour of all kinds of actors. These behavioural patterns are based on formal and informal rules that have emerged over time. These rules are not necessarily defined to further the integrations of new energy sources, as they have emerged in the past under different conditions, serving different ends. The most essential changes in ways of thinking concern modes of thought that are historically rooted in the competent organisations. This phenomenon is called 'path dependency' and reflects the historical roots of existing institutions (14; 15). The process "by which actions are repeated and given similar meaning by others" is *institutionalisation* (16, p.117). The existing ways of things are done and how they are organized all result from past institutionalisation processes. That includes, for example how infrastructure is built and how supply of electricity is organized in the power supply sector. However, at that time these institutions were framed to serve societal needs that did not include the implementation of a resource like wind, and within a context of a different socio-economic environment. The existing patterns were not designed with the new STS in mind and therefore path dependency in an existing STS is often responsible for unfavourable conditions that forestall the introduction of a new STS, such as wind power implementation. This may eventually lead to a deadlock in the development of the new system, known as institutional 'lock-in'. This is an important source of non-acceptance among different actors with regard numerous elements of wind power implementation. Therefore the third *basic assumption III* is:

> Existing institutions (existing patterns of behaviour as determined by existing societal rules) often impede the development and implementation of new views, approaches, techniques and practices required for the implementation of wind power.

The social acceptance of wind power is a complex issue due to a combination of two factors: a STS that includes wind power may induce different reactions from an actor (assumption II) and there are many different types of actors who are involved at various scale levels, all with their own institutionally embedded behavioural patterns (assumption III). This complexity provides for many opportunities for misunderstandings. These have emerged in ‘common sense’ approaches with regards learning and acceptance. What is considered ‘common sense’ is often no more than a habitual pattern of thinking that is mutually copied by actors and reinforced by frequent use. This manner of institutionalisation, the tendency to copy or follow others in the organization of an actors' own behaviour –known as 'mimetic' repetition (17)–, is a strategy used by social actors to address uncertainty as well as to mask the appearance of their own uncertainty. Existing ideas about how to implement wind power and how to integrate it in society are full of such institutionalised ways of thinking, which are often classified as 'knowledge'. However, this is often unjustified as they are in fact no more than institutionalised common sense ideas that may become barriers to actual implementation. The three major common sense approaches to wind power implementation are the technological fix (focussing on the *technological potential* of wind power), the simplification and reduction of the issue of social acceptance to mere *public acceptance*, and the one sided *focus on the objectors* of wind development.

2.4 Beyond common sense

The first common sense approach is to simply neglect the issue of social acceptance or to handle it as a secondary aspect of residual questions. From the beginning of modern wind energy development, social acceptance issues were considered elusive and hard to calculate ('soft factors') and usually negatively defined as 'non-technical factors' (1). Moreover, these factors were narrowly defined as the term public acceptance was considered synonym to social acceptance. The institutionally determined approach of society's abilities to implement wind power tends to focus on the so-called 'technical potential', sometimes combined with assessments of the financial feasibility of that potential (18). Even if social constraints are included in the assessment of the potential, they remain limited to 'planning' consideration, based on a uniform criterion for the possibility of land use for the construction of wind turbines (19). The concept of the technical potential of renewable energy options implies that technology need only be developed and applied to solve all of a country's energy problems. A study conducted in the USA found that this has become somewhat of a mantra in discussions about both electricity and energy policy more broadly (20; p.4511). However, much of the technically and meteorologically available possibilities cannot be utilised without violating generally applied social norms or without challenging existing interests. The social potential is ultimately the potential that really indicates what capacity can be implemented. The main bias in the approach of the technical potential is that it narrowly frames the concept of social acceptance as a collection of 'barriers' to achieving our potential.

The combination of the second and third general common sense approaches has prevented the understanding of social acceptance of wind energy innovation for a long time. Unfortunately, from the viewpoint of wind power implementation, they are still widespread among developers and policy makers alike (21, 22). The second common sense bias is the simplified idea that social acceptance is equal to public acceptance. The reduction of acceptance to public opinion is a strong bias, because it completely ignores the position of all societal actors beyond the level of the individual. The perspectives of these other actors, companies, public bodies, organizations etc. are certainly not mere translations of personal attitudes, and particularly not of ordinary citizens, and in many cases their influence on decision making and eventually on actual implementation rates is much stronger that that of the public (23).

The third common sense bias is the one sided focus on the potential objectors of wind energy development and neglect of the supporting side that accepts such development. Still many studies only focus upon why people oppose and why stakeholders object (e.g. 20) whereas it is equally important why wind power is supported in the first place (7, 8). Acceptance is, by definition, taking what is offered, whether by favour or reception. Of course this definition also implies the inclusion of the side of refusal in the concept. Social acceptance is a bi-polar phenomenon. Following definitions from psychology on the social acceptance of individuals (24) the social acceptance of a phenomenon like the implementation of wind power is the degree to which people like or dislike the phenomenon. The concept includes all degrees, from full refusal to total adoption. Therefore, the narrow focus on the opposing forces to wind power developments neglects the essential side of acceptance issues. The bias is that the position of support is apparently taken for granted and considered as the 'natural' position. Consequently the supportive position does not seem to need an explanation, whereas the position of refusal becomes deviant. Understanding social acceptance requires both positions to be analysed as equally legitimate in principal (7, 23).

Hence, the fourth fundamental proposition for understanding social acceptance is *–basic assumption IV –*:

> The objection to any wind power development must be considered as a potentially legitimate, rational, and informed position: All positive, active support as well as passive supporting attitudes, are equally important for obtaining a good understanding of the acceptance of wind power.

3. Dimensions of social acceptance of energy innovation

Although used often, the term social acceptance is seldom properly defined. Here a systematic elaboration is provided, starting from three distinguishing dimensions of the social acceptance of renewable energy innovations (8). These are presented in Figure 1, along with the main issues that should be addressed within those dimensions. Socio-political acceptance is related to the support or resistance towards policies that affectively promote the implementation of wind power. This is not only related to government. Today 'governance' is the preferred concept, which implies that the drafting and implementation of policy is not restricted to actors within the realm of government, but rather it includes many social actors. These so-called 'stakeholders' include all social actors who are involved in negotiating, influencing, and lobbying, because they perceive a specific policy as affecting their (vested) interests. The recognition that policy is in fact shaped within a broader arena that includes both private and public actors is referred to as 'governance' (25).

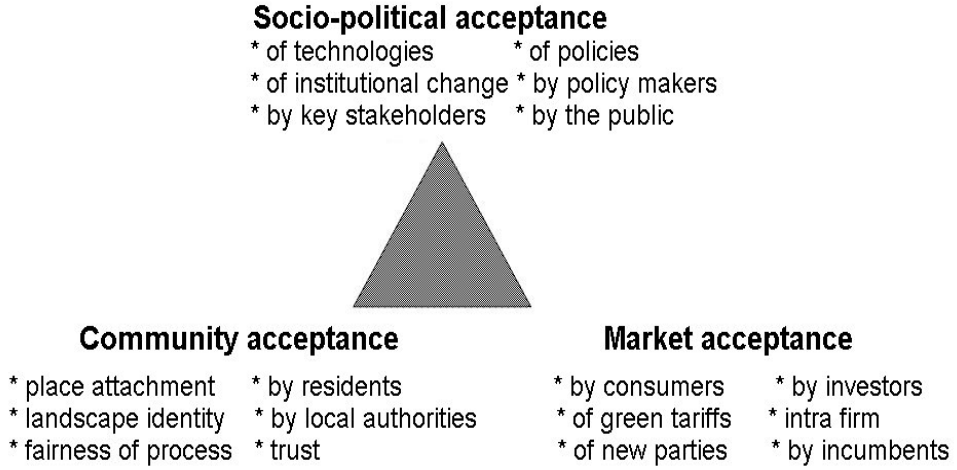

Figure 1: Three dimensions of social acceptance of renewable energy.
Adapted from (8 p.2684)

Policies tend to focus primarily on the economic investments in new STS. Policy instruments are usually designed (or perceived as designed) to create incentives for positive investment decisions. They are determined to affect the market decisions of actors. These actors primarily are incumbent energy companies, but they may also include newly emerging actors who are entering the market, or existing actors in other domains who discover wind power as a new and promising investment area. The supporting side of 'market acceptance', which is a willingness to support or take part in investment, is not the only required and favourable position, however. The nature of wind power installations is fundamentally that they are part of the phenomenon of

'distributed generation', in which the power scale, the power delivery (directly to the consumer or to the grid), the mode of operation, ownership, the purpose, and the location of the power generation are as essential as the generated power itself (26). All these elements are subject to the acceptance within the community in which the generation takes place.

In the common sense approaches, community acceptance is seen as the bottleneck of wind power development. Indeed, the most problematic issues with regard to acceptance manifest themselves in the discussions about establishing wind farms. By definition this is a discussion at the level of community acceptance, but the idea that the roots of problematic acceptance lie within the community only emerges because of the combination of two common sense views: the dominant narrow interpretation of social acceptance as public acceptance and the focus upon objectors while neglecting positive support. The three dimensions model of acceptance of renewable energy innovation (Figure 1) shows that social acceptance is much more than simple public opposition on the local level. Before discussing these three dimensions, we focus upon two basic features determining the construction of social acceptance with all three of dimensions:
- The different actors: who is taking a favourable or opposing position?
- The different subjects: to what attitude object are those actors defining their position?

4. Actors

As the first component in the social dimension of the socio-technical system, all relevant social actors involved in the process of acceptance must be considered. Table 1 shows broad categories of social actors relevant to the acceptance of the new STS. All actors will exhibit different degrees of support or opposition towards any of the socio-economic and technologic aspects of the STS of energy provision that includes wind. For example, the acceptance of wind power by an existing power distributor may be highly determined by the value it places on the intermittency of wind power. For such a company acceptance concerns the specific wind related pattern of energy production, which they perceive as complicating reliable provision (27). Their acceptance also concerns completely different aspects, such as their attitude towards newly emerging energy producers like farmers, corporations of civilians investing in wind power, or newly emerging companies that focus on development of renewables' installations. During the discussion of the three dimensions of social acceptance the question 'who is accepting?' and the actors presented in Table 1 will repeatedly be referred to. In addition to the question "who is accepting", the other main question is "what" is to be accepted will be elaborated.

Table 1. Actor categories with relevant acceptance to one ore more aspects of wind power implementation.

Stakeholders in development

- Incumbents in the existing energy supply sector
  - Existing power production companies
  - Power distributing companies
  - Grid managing organizations/companies
- Wind power developers (including many new emerging)
- Wind turbine industry related actors
- Actors with vested interests in domains relevant to establishing wind farms (e.g. R&D, consultancy, engineering, construction etc.)
- Actors representing energy consumers' interests
- All actors with secondary interest in investments in wind power (e.g. financial)

Authorities and public bodies

- National government
  - Ministries in policy domains relevant to wind power implementation
  - Energy market regulator(s)
  - Government agencies
- Regional governments
  - Spatial planning officers
  - Regional economic development officers
- Local governments
  - Spatial planning officers
  - Local economic development officers

Stakeholders in related domains

- Landscape protection organizations
- Environment and nature protection organizations
- All actors with interests in competing spatial functions
- Actors with interests in economic sectors potentially affected by wind power

Public

- General public (electorate, public opinion)
- Individuals with any perceived interest in wind developments
- Communities (geographically or socially defined)
- Civil society organizations representing affected interests
- Civil society organizations established because of wind power implementation issues
  - organizations established for private investment in wind developments
  - organizations established to counteract proposed wind developments

5. Subjects of acceptance

5.1 Attitude objects and attributes

Acceptance is an act of decision making, based on a trade-off between pros and cons. It is a behaviour based on considerations of several aspects regarding the subject. These considerations eventually manifest themselves in a positive or negative disposition (attitude) towards the intention to take action and to say either “yes” or “no” to a certain phenomenon –the attitude object–. In psychology a particularly influential framework on the relation between attitudes and behaviour is the Theory of Planned Behaviour (TPB) (28, 29). This model has proven as successful in explaining various types of environmentally relevant behaviour, such as choice of travel mode, household

waste-composting and recycling, energy saving, water consumption etc. The model is also applicable to attitudes regarding decisions about implementing renewable energy solutions (30).

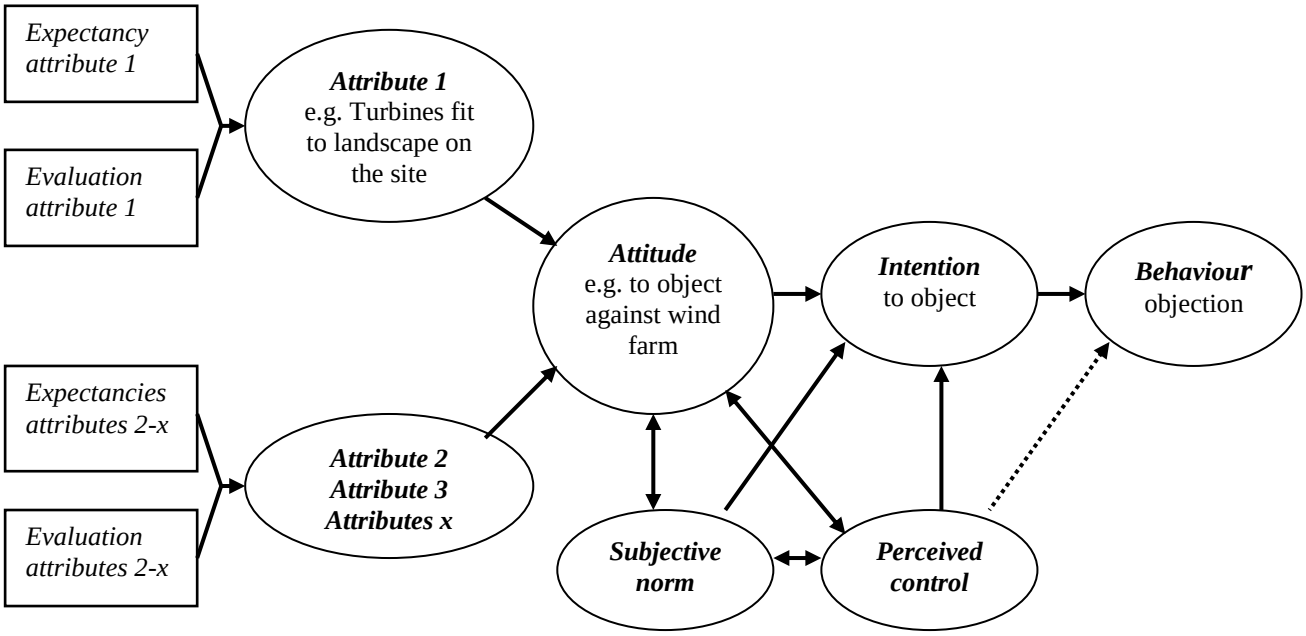

Figure 2: Formation of attitudes based on expectancies and values about attributes of the object of behaviour, in relation to intention and behaviour, according to the Theory of Planned Behaviour (29 p.182).
Subjective norm: perceived expectancies of important 'others'
Perceived control: control of the individual over behaviour and its aims.

Figure 2 illustrates how attitudes and their relation with behaviour are constructed according to the TPB. Central is the attitude-object relationship, which in this case is the concrete action of supporting or rejecting a particular decision regarding wind power implementation. Attitudes are constructed according to a model of expectancies and values. The attitude is based on several 'beliefs' about the object. Each belief associates the object with a certain attribute; a person's overall attitude toward the object is determined by the subjective evaluation of those attributes. Although people can form many different beliefs about an object (many potential attributes are presented in Table 2), it is assumed that only beliefs that are readily accessible in memory – 'salient beliefs'– influence attitudes. There are many possible actions regarding the application of wind power and all these actions are different attitude objects. From a theoretical starting point it is fundamental that there can only be clear empirical relations established between attitudes and behaviour as both are related to the same object.

The process illustrated in Figure 1 particularly holds true for attitudes held by individuals. The act of social actors and their underlying positions will generally be based on the same kind of attributes, but the way they are processed in organizations is different from the processing that takes place in the mind of an individual. However, for both types of actors, individual as well as collective, the significance of the existence of attitude-objects relation and several underlying attributes related to that object remains the same. Although it is not possible to simply apply attitude theory and behaviour on

groups of individuals that together constitute a social actor, the principle remains the same: the actions and positions of social actors also focus on an object, similar to the attitude-object relation for an individual. Hence, the question is what are the attitude-objects in the case of wind power implementation and which potential attributes exist in those cases?

5.2 Two types of objects

Within the social acceptance of wind power many attitude-objects exist, because there is a wide range of different kinds of decisions connected to wind power development. For example, an energy company may decide to invest –or not to invest– in a particular wind farm. For consumers it can also be a decision to invest in a wind farm or to subscribe to a 'green power' scheme that includes wind generated power. For a government actor it may be a decision to take on a share in the investment in a wind farm (31), to grant a subsidy to investors, to implement a certain financial procurement instrument etc. Eventually, these decisions seem to converge on the fundamental attitude of the actor towards the implementation of wind power: does an actor have a clear positive, supporting attitude or a negative, opposing attitude towards wind power. However, this is an oversimplification, as for all types of decisions the beliefs and evaluations with regard to wind power are only one of many possible attributes at play.

According to the above described expectation that there would be strong really existing relations between the attitudes, the intention and subsequently the decision (Figure 2), a fundamental requirement is that the objects of attitude and decision fully correspond. However, the attitudes towards a general support of wind power policy and the attitudes towards the construction of a particular wind farm have two completely different attitude-objects. As a result, the relationship between the general support for wind power and a decision to support a particular wind farm will be weak. The unfounded expectation that this relation should be strong, reinforced by the common sense approaches to social acceptance (Section 2.4), has led to strong and persistent misunderstandings about the nature of social acceptance. The two most important misunderstandings concern the fact that public support for wind energy, as expressed in opinion surveys, is high in most countries; however, in many of these countries, the success rates in establishing wind power developments are actually rather low. The two misconceptions are:

- Objections that result from the so-called individual attitude-behaviour 'gap': people are generally in favour of wind power, but they change their mind as soon as they are confronted with a proposal;
- The idea that objections to wind developments are simply manifestations of the so-called 'not in my backyard' (NIMBY) syndrome.

By dividing the wide range of decisions about wind power implementation into two categories, Table 2 shows the potential objects that are related to [1] decisions concerning the general application of wind power and the integration of wind generated energy in our society (on the left), and [2] decisions about establishing concrete wind developments (on the right).

Table 2 Attributes of attitudes towards Wind Power and towards Wind Power schemes.

Attitude object: **Socio-Technical System Power Supply including substantial amount of Wind Power**		***Attitude object:*** **Wind Power development**	
Essential characteristics	**Associated Attributes**	**Essential characteristics**	**Associated Attributes**
'Environmentally benign, renewable character	Alternative to fossil Alternative to nuclear Source can't run out	Wind power	Clean character Supply characteristics Visibility
Supply Characteristics	Variability Reliability Capacity credit Domestic source	Location and site	Landscape identity Nature wildlife Annoyance (noise) Wind farm design Competing spatial functions
Visibility	Visual: landscape impact of turbines Nature/wildlife: Impact on particularly birds	Investor and/or (co-)ownership	Community in/outsider initiative Contribution local economy Local shareholders Community identity
Economics	Price compared to alternatives Economics related to supply characteristics Impact on industry and employment	Decision making process	Open / closed Participation public Participation stakeholders Spatial planning procedure
Organizational aspects energy sector	Distributed Decentralised Small scale Options third parties		

5.3. Attitude object: Energy source

The idea that wind power as a renewable energy source is a clear climate change mitigation measure, seems the most obvious attribute of the attitude object 'wind power'. For this attitude object the attributes are connected to the characteristics of a new socio-technical system of energy supply that includes substantial portion of wind power. Of course a prominent characteristic of wind power is its more environmentally benign character compared to alternatives. This attribute is currently dominated by the wish to avoid greenhouse gas emissions. This attribute immediately shows the dynamic nature of the phenomenon of social acceptance. In the seventies, when several developed countries in Western Europe and some USA states introduced wind power developing policies, climate change was not an argument used to support wind power, neither in public opinion nor among the actors involved in energy supply or policy. There were some environmental arguments, as fossil fuels were clearly associated with air pollution, and also other considerations, as in several countries the public and also some governments were eager to develop alternatives to nuclear power. Clearly, the environmentally benign character of renewable source energy is still a significant attribute for the attitude object 'wind power', but the argument has only recently shifted towards mitigating climate change.

Several studies involving various stakeholders, policy makers, developers and the public, demonstrated that attributes other than the renewable character of wind are significant for acceptance by all of the relevant actors in these categories (21, 22). These characteristics and the associated attributes summarised in Table 2 are not only related to the energy source (such as intermittency) but also to the institutional aspects of implementation of wind energy, such as new options and consequences for incumbents in the energy sector and for national economic and industrial development. Their significance is very different in the three dimensions of acceptance (Figure 1) and they will be discussed in more detail in Sections 6-8.

5.4 Attitude object: Wind development project

The object of attitudes towards concrete projects of wind power application concerns two kinds of decisions: decisions about investing in such development and decisions about building a wind farm at a certain site in a particular community. The character of such decisions is entirely different from general decisions to promote or to restrain further wind power development. As a matter of fact, only one characteristic of these decisions concerns the source of energy. The other characteristics of the decisions are all related to details of the specific proposal. It is important to note that these attributes are only remotely related to the character of the energy source itself, but nevertheless they are at least equally important and often more important than the attributes directly related to wind power as the source of energy.

Some of the attributes in Table 2 of decisions about projects seem to correspond with attributes associated with the object of wind power in general. For example, in both types of decisions economic arguments play a significant role. However, the economic arguments for applying wind power and its impact on general welfare and industrial development are very different from the economic valuation by potential investors in a wind power project, or from the local community's beliefs about the existence and valuation of the project's contribution to the local economy. Similarly, at the general level, landscape issues are certainly very important for determining the attitudes towards wind power development. Here it concerns a general belief that large-scale wind power implementation will result in a myriad of wind turbines popping up in the landscape and the valuation of this phenomenon. Usually, this aspect is neutrally

referred to in terms like 'visual impact' (32), but in most studies any impact in terms of visibility is generalised and considered beforehand as 'intrusive' or 'disturbing', as if this valuation applies to all types of landscapes and also to all individuals. The landscape evaluation discussed in Section 9.1 shows that the visual impact of wind turbines varies significantly among both individuals as well as cases, and that it is not only evaluated negatively. In decisions about a particular project the general assessment is translated into 'landscape identity', which is something very different as it is not primarily determined by the common denominator 'wind turbines' but rather by the landscape characteristics of the site of that particular project as they are perceived by the people that feel attached to that site. As these landscapes vary widely among different project cases they cannot be considered as principally determined by the general landscape assessment of wind power.

A similar 'translation' takes place in the organization of energy supply. For wind power in general, as is discussed in Section 6 on socio-political acceptance, the option for third parties and new actors to invest in wind power is a relevant attribute (Table 2). In the translation into a particular project this becomes a question of wind farm ownership and community involvement, or the acceptance of investments and ownership of a wind power development by companies from outside the community (33).

The large differences between the relevant actors and attributes in the decisions about applying the energy source and the decisions about building wind farms result in only a weak correlation between support for wind power and support for wind farm proposals. The limits of this correlation, usually referred to as the 'gap' between general high acceptance of wind power and the large number of failing decisions about building wind farms (34), are poorly recognised and understood by wind power advocates and policy makers alike. The fundamental question regarding this 'gap' is why decisions about a particular project, which are taken by local actors and the interested investors, would be highly affected by the fact that national public opinion shows high positive responses to wind power. A clear correlation between general national public opinion and local decision making is theoretically not supported. Even within a single actor there is a distinction between the attitude with an attitude-object (wind energy) that is entirely different from the object of behaviour (taking decisions about investing in a wind farm and siting it). Table 2 shows that both objects have many different attributes; therefore, the fundamental condition that the objects of attitude and behaviour must be the same to find a clear relation between attitude and behaviour (28; Figure 2) is not fulfilled. The common sense idea that a decision regarding building a wind farm is primarily informed by general attitudes on wind power, is unfounded by what is known about the relationship between attitudes and decision behaviour. Speaking in terms of attitude-behaviour theory, the objects of attitude and behaviour simply do not correspond.

5.5 Mind the 'gap'

With regards the assumed 'gap' between general acceptance of wind power and still a low number of positive decisions to build wind farms, Bell et al. (34) distinguish between a possible 'social gap' and an 'individual gap'. The 'social gap' refers to the high level public support for wind energy expressed in opinion surveys and the low success rate achieved in planning applications for wind power developments.

The individual 'gap' emerges from the idea that many of the failures to establish wind developments arise from the fact that individuals, in particular local residents, have a positive attitude to wind power in general, but actively oppose a particular wind power development when confronted with a proposal. The most popular common sense

explanation for this assumption is the claim that NIMBY-ism is responsible for this gap, but Bell et al. already explain the weaknesses of the NIMBY claim in explaining an attitude-behaviour gap (34 p.465). This popular label is briefly discussed in section 5.6, as it is currently still prominent in common sense thinking about acceptance of wind power.

However, the terminology of an existing 'gap' may also be considered disputable. Table 2 shows the different potential attributes that can be connected to those objects. The comparison of these two categories already reveals a large divergence between the objects in the two columns. The attitude object 'wind power' (left) is only one of four main characteristics of the object 'wind power project' (right). Attitudes towards a concrete proposal for the construction of a wind farm at a specific location and towards investing in a wind farm include many potential attributes all related to variables that show a wide variety among cases. The fact that this proposal is an attempt to implement wind power is only one of these many attributes; some of the other attributes are often more important for key actors than the implementation of wind power. Examples of potentially more important attributes include the type of the developer –from a large energy company to a non-profit community associated initiative–, the landscape of the chosen location, the connection of the wind farm to the local economy, the potential environmental impact, etc.

From a developers' point of view, the struggle to site a wind power development is easily interpreted as a problem of local inhabitants trying to safeguard their environs against turbines (2, 35). The number of documents reproducing the common perception that any resistance these developers face is an indication of a so-called NIMBY-syndrome is overwhelming and this common sense view is continuously reproducing itself. It is prominent among the strong proponents of wind power and presented as a 'fact' (36, p.299). As this idea is engrained, some discussion is required, above all because it is a perfect example of institutionalised thinking patterns that eventually become barriers to acceptance of wind development schemes.

5.6 The backyard

Many proposed wind developments indeed do encounter resistance, but this cannot be considered evidence for the existence of a NIMBY syndrome. Stronger evidence is needed that the individual's motivation to resist is as selfish as the use of the term NIMBY suggests (36). The problem is that such evidence has seldom been found, but still the interpretation of any opposition in terms of the backyard is repeated over and over again (38, 39). Any reference to an alleged 'not-in-my-back-yard' syndrome suggests a degree of selfishness, conservatism, unwillingness to cooperate, or ignorance of environmental issues. For example, with regard to renewable energy facilities Kahn (35, p.26) gives a fairly clear characterisation. A NIMBY opponent would be

- *democratic* with a small "d", since his/her political right of self-determination is exercised to the fullest;
- *parochial* because he/she is unconcerned with broad impacts;
- *reactive* in that he/she is not generally concerned with planning or siting issues per se; and
- the NIMBY -opponent is *not an environmentalist*.

Although this view is still very prominent among developers and policy makers, with the start of public and social acceptance studies in the 1980's, researchers started to question the relevance of this rather normative NIMBY-label. The first notion to be reluctant with the use of this label suggested that it is dangerous for authorities or utilities to use this acronym. It tends to offend the public and will generate stronger opposition and the use of the qualification may easily become counterproductive (40).

The indolent use of the NIMBY label has become a tool to question the legitimacy of the opposition and the actors who represent it. This is a violation of basic assumption IV – about the legitimacy of all views on wind power implementation – and as such it has become an indication of socio-political non-acceptance. Since then, the 'theory' of the backyard motivated resistance to wind developments has increasingly become discredited by researchers: "The NIMBY concept that has been most frequently used to describe negative perceptions of wind farms has failed to receive empirical support" (38, p.136). In fact, all researchers investigating the motives for resistance to wind developments, in light of the general public support for the technology, reached a consensus on NIMBY (34, 39, 41, 42), which is succinctly summarised as follows: use of this term does not explain the opposition. There are three general reasons against the use of this term. "First, it is generally used as a pejorative implying selfishness as an underlying cause; second, it appears to incorrectly describe much of the local opposition to wind projects; and third, the actual causes of opposition are obscured, not explained, by the label." (43, p.124)

The erosion of the assumed relevance of NIMBY-ism is not only due to studies on wind power. For example, a study on the acceptance of nuclear waste storage facilities also questioned its applicability, as it observed that the users of the NIMBY-label do not apply a clear definition and hence, do not make clear what they really mean when they use the label. A clear definition is needed, because if all opposition to facilities were NIMBY-ism, then the concept would be both quite empty and unnecessary (44). However, when it is clearly defined what motives are distinctive for NIMBY-ism, there is hardly anyone found to whom the definition applies (44, 45). The most distinctive definition of NIMBY is "an attitude ascribed to persons who object to the siting of something they regard as detrimental or hazardous in their own neighbourhood, while by implication raising no such objections to similar developments elsewhere" (46). The second part of this definition is crucial, because it distinguishes NIMBY from mere opposition and it explicitly relates the opposition to the backyard. Most of the manifold critical stands are related to this aspect, because in fact there is no research evidence that the opponents would not object to the siting of turbines under similar conditions elsewhere.

Developers and policy makers, in particular those in countries that have not been successful in establishing institutional frames that facilitating rapid implementation rates, are still inclined to think in terms of 'backyard' attitudes of the local public (21, 36). The persistence of this inclination is probably due to the fact that ultimately the local level is the level where the real decisions about investments and building concrete wind power farms are taken. The institutional factors that affect decision making on that level are summarised in Figure 3 (47). It is good to note that factors such as 'population density' and 'geographical potential', including the geographical distribution of wind resources, are clearly informing the possibilities for establishing wind farms. As described in the section 'Institutional change' the focus here is on the institutional factors that found in the upper part of Figure 3. The key question is how decision making on the local level is organised and how social networks, operating on either the same or other levels, are influencing those decisions. Market acceptance and community acceptance are mainly connected to this level, whereas essential factors that are framing those decisions are located at the level of general socio-political acceptance.

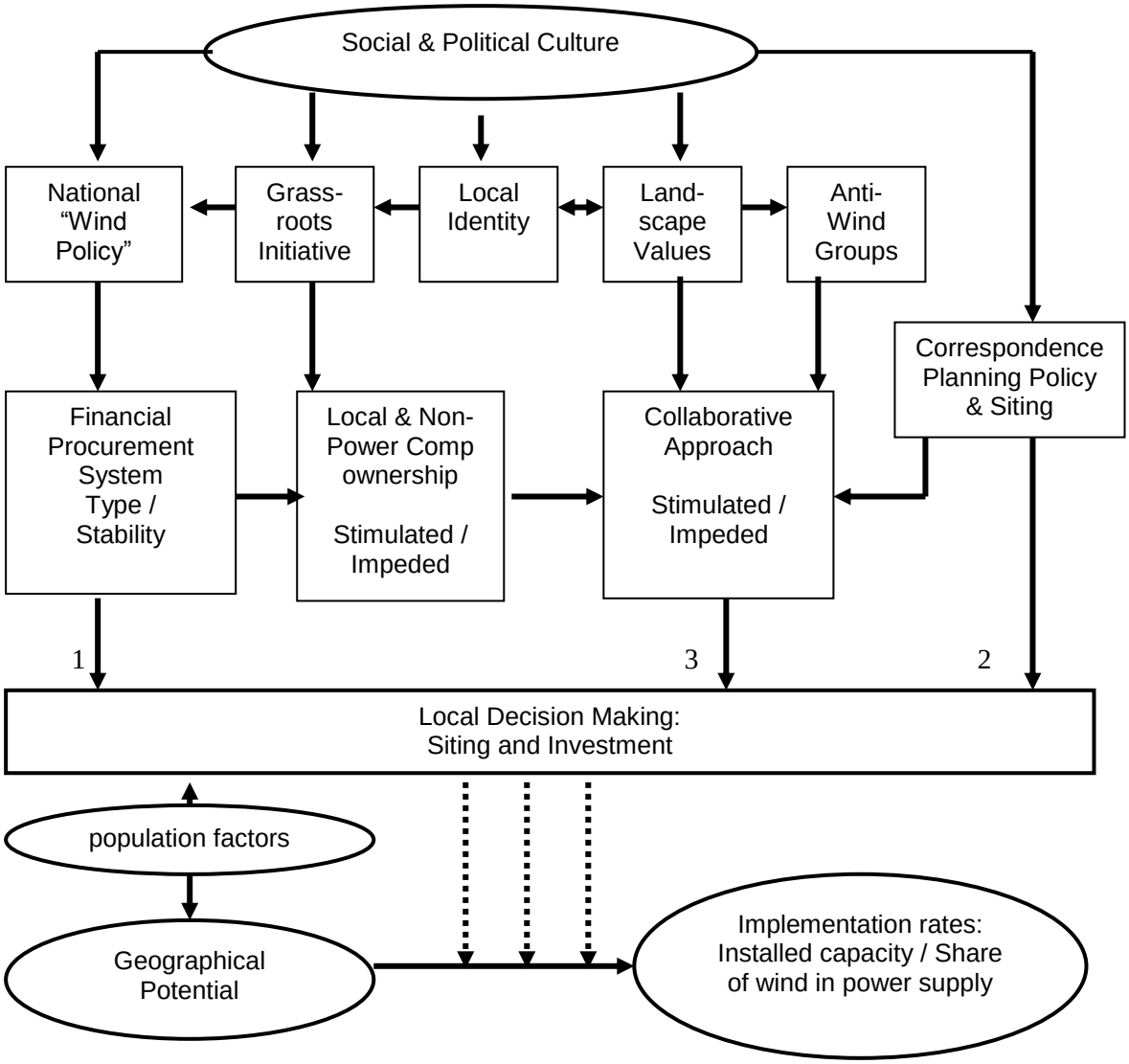

Figure 3. Overview of institutional factors affecting the decisions about wind power implementation (adapted from 47, 108).

6. Socio-political acceptance

The three keys elements to securing to positive decisions about establishing wind farms are:

(1) The shape and the reliability of the financial procurement system (Figure 3: 1), which is of overwhelming importance for the utilisation of the potentially significant willingness to invest in wind developments;

(2) The type and amount of effective support generated within the national and regional planning system for policies that develop wind power capacity (Figure.3: 2);

(3) The degree to which collaborative decision making on the level of communities is allowed and stimulated by the socio-political framework (Figure 3: 3).

The third factor is closest to the central question in socio-political acceptance, as this factor is partly determined by the two others, the financial procurement system and the planning regime. Collaborative planning and decision making (48) is the favourable condition for reaching positive decisions about wind farm construction, but the conditions that determine whether or not collaborative approaches prevail at the community level largely depends on socio-political acceptance. The willingness to establish effective support regimes in these domains varies greatly. Clearly visible in

Europe (Figure 3 is the result of an analysis of six EU cases) (47), it has also been equally significant in the comparison of the effectiveness of policy frameworks among states in the US (49, 50).

There are four institutional variables which concern decision making above the community level: the institutional and financial support system; the planning regime that should be in line with the support system (50); the value attached to landscape preservation; and the framework determining the degree of local ownership of wind power schemes. Of these four, landscape values are connected to history and largely culturally determined and exercise great influence on decision making regarding wind power schemes (see section 9.1). It is one of the reasons why a collaborative approach in decision making is so important. The other three factors are mainly informed by the institutional developments in the dimension of socio-political acceptance. These three constitute the institutional capacity that can foster and exploit the high average support for wind as a power source (Table 2, left). Some countries have shown limited learning to develop this institutional capacity (51). Most still rely upon the assumed high level of acceptance among the public. This support is very strong in most countries, but it is important to notice that in all countries there is a minority that does not support wind power and, furthermore, support is almost always conditional (34). In order to meet the conditions for that support, serious institutional change is needed, but those changes are subject to socio-political acceptance.

6.1 Institutional conditions

The main problem with socio-political acceptance is that it is hard for policy makers to recognise basic assumption II of social acceptance, the institutional nature of WP implementation, especially the socio-cultural side of the STS. Within policy there is a strong rooted institutional tendency to look at energy issues and at environmental issues in general primarily – may be even solely– as technical problems. Also experts see the 'energy problem' as a chiefly technical issue, and policymakers tend to continue to overly rely on technology for providing solutions to issues that it cannot address, namely deeper social, political, and cultural problems (53). If one assumes that policymakers are willing to promote wind power, this inappropriate focus remains an obstacle to looking at the technologies to be socio-technical and consequently policymakers continue to promote renewables ineffectively (20). Although many developed countries have been promoting wind power for more than two decades and also have instituted policies in support of wind power, there are enormous differences in the effectiveness of these policies.

The comparative assessments of countries and state-specific socio-political contexts provide some understanding of the policies and processes that affect wind deployment. For example, a comparison of four US states established that although the state of Massachusetts implements supportive policies, this support has been insufficient to trigger deployment as deployment costs remained very high. On the other hand, Texas' targeted policy and spatial planning fostered policy that was in line with the energy policy objectives and facilitated deployment. Furthermore, the positive aspects of community-based wind development have been shown, also with regard public acceptance, in particular in Minnesota (53) and Texas (54).

Related to the factors in Figure 3 (discussed in the next sections in greater detail) it is important to emphasize that the existing discourses on all aspects of socio-political acceptance among all important key stakeholders show fundamental differences, for example in Europe (21), the UK and Australia (22). Also in the US the nature of wind energy discourses differ significantly within states (53). These contrasting discourses reveal strong deviating beliefs about the necessity of wind generated power as well as

fundamentally deviating beliefs about how to implement wind power. These differences reflect separately operating and usually competing advocacy coalitions within the domain of policies that are relevant to wind power. Within the conflicting policy belief systems of these advocacy coalitions (55), the problematic nature of socio-political acceptance is reflected (21). These strong differences reflect the level of acceptance for the change of essential institutions, for example the willingness to support the choice for and the implementation of effective regulatory regimes and the willingness to establish planning regimes that create the necessary environment for collaborative decision making at the local level. Besides overcoming the resistance from strong stakeholders, in particular in the energy sector, it is not easy to introduce supportive regulatory systems. Supportive regulation is complex: changing a single element of a current system, for example only the financial support system, or only the planning regime, will not overcome barriers at deeper political, cultural, and social levels.

6.2 Public opinion

What is usually seen as most problematic, general public acceptance of the energy source, is in fact least problematic (23). Several indicators show, from the beginning in the eighties and nineties onwards (56) that public acceptance of renewable energy technologies and policies is high in many countries. General public opinion polls in Europe show that the majority agrees with public support for renewables, also in countries where the government provides relatively little support (57). In the US a majority also supports building wind facilities. In a study on different power generating facilities, it was found that attitudes about plant siting depend heavily on perceptions of environmental harm and costs of the particular facilities, but the effects of these attributes are similar across different types of fuel sources (58). This suggests that people view all power sources in the same framework and differentiate them on perceived endowments, environmental harm being the most important. Thus, both solar and wind power enjoy high public rating compared to other sources (57, p.27). This positive overall picture of public support for the wind power as energy source for a long time misled policy makers to believe that social acceptance is not an issue. This is a mistake, for three reasons:

(1) General public support is only based on attributes with regard to the energy source in general and not connected to attributes that are cases specific (Table 2).
(2) Public support is based on fairly low information levels (59). As a result, when the public becomes better informed their views become more balanced, for example when there is a wind power proposal and a public discussion about it within their community (60). In fact, because of the very high level of positive attitude in the poorly informed initial condition, the average shift as a result of becoming informed shows the pattern of a regression to the mean (see the end of this section).
(3) Public support may be averagely high, but this average still contains a minority of people that generally do object to wind energy. In all studies on discourses, the objectors to wind energy appear as a distinguished class of actors, not only among the public but also among the key actors in wind power decision making at all levels (21, 61). In concrete cases of wind farms proposals, the part of the public and the actors that represent this objectors' discourse will almost certainly participate. Because of the strong emotional component in landscape valuation their involvement in decision making is usually very intense, because is landscape is the main attribute for attitudes towards wind power projects (see section 9.1).

The common sense focus on opposition as a barrier to wind power development implies a 'taken for granted' view on the willingness among the public to take positive decisions about wind power. While the willingness to invest (positive investment

decisions) and the willingness to integrate wind power applications in the community (positive construction and application decisions) are conceptually very different. In practice these two are sometimes treated in a similar way within existing institutional arrangements. For example, willingness to pay for 'green power' (62, 63) is by no means similar to willingness to invest in a wind farm and even less similar to a positive attitude towards a particular wind power scheme. Therefore, a positive attitude towards 'green power' or 'green tariffs' is not a proxy for public attitudes towards renewables in general and even less for attitudes regarding wind power (see section 8).

A particular feature of public acceptance is its time dimension. The typical pattern of acceptance before, during and after a project follows a U-curve, falling from high average general acceptance to more critical levels of acceptance during the siting phase (usually still positive on average) and back up to a higher level of acceptance once a project is up and running (40, 60). Remarkably, this effect is due to the low levels of public knowledge in the first stage, when people are not yet confronted with any wind development in their environs. Information and discussion about a concrete project in the community is increasing knowledge. This is making attitudes more nuanced and therefore averagely less extremely positive in cases where no high emotional attributes prevail. In other cases it may also result in more polarization, which also means a lower average positive attitude, when strong emotional attributes – community and landscape identification related– are at stake (65). Again, this attenuation effect on the generally positive attitudes as a result of increased information levels runs contrary to common sense, as developers and authorities often expect that increasing knowledge will help to reduce objections against wind power projects (64). However, this expectation is based on an illusion, as there is no study that provides any evidence of a positive relationship between the level of knowledge about wind energy and attitudes towards wind energy or towards a particular wind power project.

Whereas the general public support does not imply strong impediments for wind power implementation, the following set of institutional domains in policy development and energy provision are the distinguishing determinants for the level of socio-political acceptance.

6.3 Economic conditions and financial support

Support regimes and their stability provide the basic premise for successful wind power programs and their perceived stability has a positive effect on investment decisions. The support regimes are primarily financial, and obviously the substantial incentives provide a stronger support than small incentives. However, the institutional conditions of the support systems are even more important: do they subsidize capacity or generated energy?; do they support existing incumbents or do they attract new market actors?; are they subsidies ultimately paid by tax payers or are they guaranteed rates ultimately paid by energy consumers? These essential characteristics affect the effectiveness of the support as well as all three sorts of social acceptance.

In most countries the dominant approach has been to stimulate investments with the introduction of government subsidy or by deploying a tax credit. However, the renewable energy feed-in tariff (REFIT) system, as a financial procurement system, has become a cornerstone for the deployment of wind power in successful countries (66, 67). The effectiveness is due to the fact that this system is not only favouring investments –market acceptance– in wind schemes, but it is favouring investments by new actors in energy production which is also supportive to collaborative planning of wind power schemes because those actors often have strong connections or are rooted in the community (Figure 3).

The clear example of the promotional role of this key instrument in fostering social acceptance is the innovation of wind and solar technologies in Germany, which is linked to the rapid diffusion that resulted from the nature of the policy instruments employed. However, the application of a clearly effective policy instrument like REFIT is everything but easy; most countries did not implement it and in fact it's implementation is subject to socio-political acceptance. Analysis of the socio-political process that led to the adoption of these instruments in Germany demonstrates how the regulatory framework is formed in a 'battle over institutions': "The German parliament, informed and supported by an advocacy coalition of growing strength, backed support policies for renewables sourced electricity against often reluctant governments and the opposition from nuclear and coal interests" (68, p.256). On the one hand, this example illustrates high acceptance as the instruments that were implemented were very effective indeed, but, on the other hand, the example also reveals that there are also strong forces that provide sound resistance in the policy process. Such resisting stakeholders exist in all four categories of actors (Table 1), but with regards the financial procurement system and the guaranteed access to the grid the strongest resistance is often found among the incumbents in the energy sector itself (47, 68). This feature of access of new market actors in fact reflects the choice to prioritise power generated with renewable sources over conventional power generation, and the appearance of new actors on the market is a key in innovation processes (8, 12). The incumbents in the power sector prefer a system based on Renewable Portfolio Standards (RPS) with a claim that such systems are market based. Although they do not create an electricity market (unlike REFIT, which creates this marked based on fixed prices) and only offer certificates, RPS supporters claim that it is more market based and more cost-effective (69, 70). However, several studies have shown that REFIT is at least far more effective, and some also claim more cost-effective (70, 71). The RPS systems actually limit the market to a few large energy companies (67, 72).

National policy defines the objectives, conditions and instruments of the financial support systems. Most significant is the fact that REFIT grants grid access to all and it provides financial risk reduction for new investors (70), and therefore it supports new, more inventive and renewable-friendly players, thus enhancing market competition. Furthermore, the emergence of such market competition puts pressure on the incumbents. This is a crucial positive reinforcement for any civil society initiative that seeks to promote renewable energy. In order to exploit the large potential of supportive attitudes in the society favourable conditions and institutional change are needed. The introduction of REFIT-systems was a major effective institutional change in some countries, but many countries still refrain from introducing such systems. Moreover, despite its undeniable effectiveness, the REFIT is continuously under attack from energy companies and several EU member state governments. The new regulatory regime in Germany has gained widespread support, but resistance still exists and has sought to influence European regulation in order to replace the regulatory regime adopted in Germany (73, 74).

The most significant institutional changes –changes of the 'rules of the game'– are achieved by political decisions, so the roots of the huge differences in success rates of wind power implementation can be found in primarily problematic socio-political acceptance. In some countries socio-political acceptance of effective new regulatory regimes has been high and accompanied by policy changes, in many other countries it has enjoyed only rhetorical support. Expressed preference is not always evidently followed by action among policymakers and structural measures –institutional change– are yet to materialise.

6.4 The impact of the spatial planning and of location decision making

A persistent line of explanation for the implementation deficit that several countries experience with regards their performance achieving substantial wind power capacity is the existence of a 'planning problem' (75). This implies that spatial planning would constitute a 'barrier' to the expansion of wind energy. Most of the attention in social acceptance studies has been focused on studying the continued deficit in implementation as a result of problematic local decision making (8). From the developer's perspective, the planning problem is usually interpreted as an attitude-behaviour 'gap' between general public support for wind power and local opposition to wind power schemes (section 5.5). The reaction to these problems is often a request for more perseverant planning instruments that would enable authorities to overrule local opposition. However, the nature of the planning problem is strongly contingent on the discourse that the actor supports and the most prominent followers of the 'planning as a barrier' line are found among developers and authorities in countries that have not been very successful in implementation (21). Actors in more successful countries have learned that collaborative planning approaches that foster civil society initiatives and involve local stakeholders generally produce an increase in positive decisions about investing and siting wind farms.

The request for a more powerful, in fact top-down planning regime produces a uniform, inflexible system. Motivations for adopting such approaches may also reflect centralising planning cultures. A clear example of this is the Welsh approach to the planning problem, as a reflection of the UK's centralising tendency in planning. The Welsh 2005 planning guidance on renewable energy superimposed centrally-determined 'Strategic Search Areas' for large-scale, onshore wind farm development onto local decision-making processes (75). It is doubtful whether such increased centralisation will help accelerate wind power implementation. In a comparison of UK and Australian policies, it was concluded that such policies did not ease conflict over wind energy projects. On the contrary, they have been criticised as endorsing wind energy while neglecting concerns about landscape and place (22). Another example is Sweden, where the main purpose of the national planning instruments is to strengthen wind power as a public interest in local land-use planning processes. According to Bergek (76), this purpose is not well served because civil servants became more inclined to treat wind power as a private interest when the country targets are achieved.

If national planning uniformly superimposes the locations and site selection it can only apply the general attributes of wind energy (Table 2; left column). In decision making regarding projects, these constitute only a part of the attributes (Table 2; right column) that are significant to the actors involved in the process. In the practice of such decision making, another UK study showed how the attitudes of people in the immediate vicinity of proposed wind farms exercised the most important influence on the decisions made by local authorities (77). This includes the perception of the appropriate match between the wind farm and the character of the landscape (section 9.1) but also concerns the perceived local economic benefits. Interestingly, the study also concluded that there is a lot that wind power developers can do to improve the prospects of successful planning. This is where the endorsement of national policies through top-down planning may easily become a factor creating mistrust (see section 7). In addition to landscape concerns, negative attitudes also emerge in response to the dissatisfaction with the planning and decision-making processes (78). The opposition to wind power developments may even be shaped largely by the manner in which planning and decision making on wind schemes takes place (60, 79), for example the manner of organising public consultations (80). The issue is that all local cases of wind power implementation show a wide variety of place identification factors, because both the

landscapes as well as the social structure of the host communities differ greatly. Hence, the attributes of wind power developments as listed in Table 1 will be assessed differently in all cases. Uniform policies cannot address this diversity. Studies of the underlying reasons for opposition show that the objections are very heterogeneous (61). As wind power is already a contested realm, also the legitimacy of national policy is problematic, in particular when hierarchical power is used overtly to site turbines.

In case planning is actually organised with a focus on local decisions and not primarily based on national uniform policy regulation, the consequence is that the planning context may vary between different municipalities, as community acceptance levels may be different and may also vary in time. This poses a particular difficulty for larger, nationally or even internationally operating companies. It is also not congruent with national uniform systems that claim to support wind power in a cost effective way. As was noted in an analysis of Swedish wind power planning, municipal planning tends to undermine the cost efficiency goal of the 'green certificates' trading systems (81). In Germany the feed-in support system –REFIT– has positively affected the involvement of the civil society and local initiatives to wind farms and correspondingly. The implemented planning system did not endorse the selection of sites by higher authorities, instead it only set a priority for wind developments *('Priviligierung')* and then left the actual planning of the local wind development and site selection to local authorities (82).

There are huge differences in national planning systems. In general, it can be concluded that planning systems are not creating the problems of social acceptance. Planning is not the source of the problems, but in many cases may become the carrier as the planning process is framing how local decisions are taken and most issues related to acceptance manifest themselves in the planning process. Therefore, supportive planning systems are generally those that effectively foster and enhance market and community acceptance, i.e. a system that stimulates collaborative decision making at the level where crucial decisions about establishing wind farms are taken. Substantial evidence points to the many benefits of the early, sustained and reciprocal engagement of host communities. Such strategies have been linked with improved chances of planning success and are seen as offering developers the opportunity to gain the trust of host communities and among actors that invest in wind power projects, to identify and address their concerns and to effectively communicate the potential risks and benefits (42). This does not happen on the national level but rather mostly on the local, with the notable exception of Spain (31).

7. Community acceptance

7.1 Two dimensions of community involvement

Historically, the focus within this issue of social-acceptance of renewable energy innovation has been on public acceptance as the cornerstone of community acceptance. Community acceptance refers to the specific acceptance of siting decisions and renewable energy projects by local stakeholders, particularly residents and local authorities. In the common sense approach of 'non-technical factors' (see section 2.4) it was soon recognised that energy companies trying to develop pilot projects faced problems with the communities. Because they were usually incapable to handle these problems, about the local resistance in the communities where they wanted to establish those developments the debate around NIMBY-ism unfolded. Section 5.6 describes that this classification of local non-acceptance is not fruitful as it violates Basic Assumption IV by questioning the legitimacy of the actors' positions and because it fully neglects the high potential of positive acceptance at the community level of initiatives that

originate within the local community itself and in civil society more broadly. The utilisation of such labels denigrates opposition to proposed wind development as cynical and selfish.

Most case studies that analyse the motives and beliefs of local actors reveal a wide range of considerations, ranging from strong support for local initiatives to rejection of wind developments in principle. The essence of the difference between the positions that people take regarding specific wind development projects and the support for application of wind power in principle is that the latter general support is qualified (23, 34 p.463). All actors in society may be prepared to support any wind development that meets certain criteria, and they will tend to oppose developments that do not meet those criteria. From the developers' point of view, their main concern is the construction of the wind turbines, but other actors have other concerns: the selection of a site out of many alternatives, different options for who is the investor and owner of the turbines, and considerations on who will decide about the project and how. For the developer these aspects are not variables but self-evident constants. They are inclined to present the proposal in a way that creates a narrow frame for the community. The developer is not inclined to look at himself as a variable, as just one out of many alternatives. Usually, the proposal is a wind farm at a chosen location with an already selected site. For the community this manner of planning a wind power scheme (‘decide–announce–defend’) is seen as 'framing' the decision-making process: it presents the most significant aspects of the project as already decided upon, without their participation (60).

This 'framing' of decisions of wind power is rooted in several institutions, such as rules and procedures in spatial planning systems, and existing preferences in energy policies that favour developments initiated by the incumbents in the energy sector. The process of altering these types of institutions is part of socio-political acceptance (section 6). Moreover, these kinds of problems do not remain restricted to wind power. Local acceptance of all types of infrastructure facilities is steeped in local conflict (83) and infrastructures that aim to further environmental policy targets, such as environmentally benign waste management and climate change adaptation or mitigation are no exceptions (84). The roots of these conflicts are complex as they always combine opposing interests regarding the use of the facility and the burden of the facility in terms of local social or environmental impact. Considering wind power, four different types of conflicts of interest may be recognised, which are based on two dimensions:
(1) Application of wind power as a public interest versus wind power as a private interest of the owner of the wind farm, and
(2) Wind power in conflict with various private interests versus wind power in conflict with public interests of the community (76, p.2360).

Actors of all four categories listed in Table 1 are attached to any of the four types of conflict. By definition developers represent private interests, except when local or regional authorities participate in wind farms, as occurs in Spain (31). Nevertheless developers often claim that their project is an application of an environmentally benign energy source and represents a public interest: “The benefits of wind power are felt by the masses in improved environmental quality, diversity of energy resources and compliance of international agreements [..but] the costs are borne locally.” (85 p 505). In case the developer is a community outsider, such as an incumbent energy company, the local perception will assign the developer as representing private interest, whereas the impact is perceived as a burden to the community’s public interest (33). When developers emerge from within the community their interest may be private (e.g. a farmer) but it may be public when the developer is a cooperative rooted in the community, as frequently has been the practice in success stories like Denmark and

Germany. In addition to these interests, there is the second dimension of community involvement: the decision-making process that may vary from closed and institutionally constrained to open and participatory. On both dimensions of 'community renewable energy' the utility wind farm scores low, with severe consequences for its acceptability from the community's viewpoint (33, p 498).

7.2 Identity of place

Related to the local acceptance of wind power projects is the question whether institutional settings foster the community's identification with the project, such as locally organised or publicly owned wind power. This can obviously be the result of community involvement in the outcome of the project, which can take the form of ownership or shareholder participation. However, the identification can also be more symbolic 'sense of ownership' (86), as a result of effective involvement and influence in the siting process. Moreover, all these forms of involvement are part of collaborative decision making at the level of wind power scheme (Figure 3:3). How decision making is organised and how social networks at this level are involved in projects strongly shapes the possibilities for identification with the project by all actors at the community level (87).

The most frequently mentioned common sense interpretation of identification is the proximity of the selected wind farm site; this proximity hypothesis is closely associated with the 'backyard' explanation of rejection of wind farm development, i.e. local attitudes to wind power would be negatively correlated with proximity to wind turbines. However, studies have failed to find evidence for the presumed negative effect of spatial proximity on public attitudes. Although some studies did indeed find more negative attitudes at closer distance (54) several studies found –sometimes to the researcher's surprise– that attitudes to wind power as well as to the existing project became more positive at shorter distances (63, 86). These results also seem to be independent of the national policy context. For example, a recent study in New Zealand found similar results to the previous studies in Europe: neither was there a clear relationship between the proximity of the submitters of appeals to the proposed wind farm and their appeals, nor did proximity increase the likelihood of them having negative perception of the proposal (88).

If it is not proximity, then the question is what really motivates local actors (i.e. residents, their civil society organisations, and the representatives in public administration). An alternative proposed for proximity or the narrow interpretation of backyard-protective reactions is '*identity of place*' or '*place attachment*' (89-92). These are both concepts in which the focus of explanation shifts away from the physical aspects of the development towards the socially constructed, symbolic attributes of places. It is essential how the identity of a place is interpreted by members of the community (not primarily restricted to residents) in order to 'fit' with development proposals. Several empirical findings support the significance of the link between responses to facilities and place attachment and community commitment. A well-known example is hydropower (93), but recent studies on wind power have also confirmed the importance of this relationship, among residents and local communities (54).

In the concept of place attachment there is a prominence of social and physical elements, whereby the latter are connected to landscape characteristics in particular (94). This follows the general finding that landscape quality is by far the most important attribute of attitudes towards wind power projects. In environmental conflicts about siting wind power schemes, in the common sense approach, the wind turbines are the object of the conflict; however, in fact the physical space is the object of the conflict and not only the location of the conflict (section 9.1).

The meaning of the concept of ‘community’ can also be based on the feeling attached to the physical as well as the social attributes of a place. For example, place attachment can be high among the members of organisations that works on the preservation and conservation of certain areas. The conflicts over renewable energy facilities has often a character what has been labelled as 'green on green' (41), with organizations that belong to the environmental movement at both sides of the conflicts. As many environmental organizations have primarily emerged because of landscape and nature protection values, their natural reaction to wind farms also concerns the potential threat to these values. Their identification will usually be strong because of values of landscape and ecology, but the identification will also be rooted in historic links to a place or in general ideas about the character of areas, e.g. in terms of 'rural' (95, 96). Studies also showed that this identification with places does not necessarily reflect negatively on the development of wind power (see section 9.1) and the clearest example of this is the fact that farmers often have positive connotation with ‘harvesting’ the wind on their land because they are used to associating their land with production. On the other hand, in some cases proposed wind developments are the origin of new emerging landscape protection organizations (97).

7.3 Benefits

The most problematic aspect of community acceptance is caused by the fact that in many countries the framework of socio-political acceptance leads to projects that are initiated by actors who are outsiders to the community. First, this model neglects the potential of support for wind power initiatives that originates from within the community. Second, the community and the places valued by the community are used for interventions that do not create benefits for the community. Some studies suggest that local financial benefits "are critical to the acceptance of new turbines” (85 p.507), or, put in a more prudent way, “renewable energy projects can become more locally divisive and controversial if benefits are not generally shared among local people” (33 p.499). Clearly, the benefits are shared when community members are shareholders in the wind farm, and the conflict of private vs public interest is effectively mitigated (76).

Thus, in all cases of wind farms initiated by developers outside of the community, securing benefits for the community represent a significant problem. Nevertheless, community benefits can also be defined more broadly than direct financial gain. As long as community members perceive the local benefits as valuable, they can be considered substantial, for example when they concern involvement of local small companies and employees in construction, maintenance and management of the wind farms. Contribution of renewables is often suggested to positively affect local sustainability in a general sense. In the same way that usually the environmental dimension of sustainability is emphasised (98) the local dimensions of the social – inclusion, governance– and economical dimension –development, efficiency, employment– may also be promoted by a wind farm (99). Several studies have shown indications that wind farm developments have indeed furthered local employment and the local or regional economy. However, these results remain ambiguous: the effects cannot be considered substantial (100) or the benefits are not experienced in the community but more dispersed so general employment benefits are found at the national scale (101). Special cases of community economies that may benefit from wind power projects can be found on islands, where wind power may help to reinforce the sustainability of the community (78, 102). The general picture of local sustainability through wind energy is ambiguous, without any notable general tendency. This is reflected in the discourses around decision making on wind projects in the community. A clear objector’s discourse has been recognised in a discourse study focussing on

presumed negative local economic impact (61). A general framework to analyse the contribution of renewable energy deployment to local sustainability has been proposed by Del Rio and Burguillo (99).

Some aspects should still be mentioned, as in certain cases they affect the acceptance of communities. These are farming and tourism, both economic sectors that may be considered land uses that compete with wind power deployment. Concerning the contribution of wind power to local sustainability, there is some evidence that rural areas may benefit because farmers are able to continue their business with a new resource to harvest from their land. As a matter of fact, this kind of positive acceptance is clear in most countries as many private investments in wind have been made by farmers on their own land. The picture for tourism is generally less positive. Community acceptance is adversely affected by the perceptions that clients, the tourists, would not like turbines. Communities that heavily dependent on tourism, and in particular the stakeholders with interest in those activities, tend to be reluctant to allow renewable energy infrastructure –including wind turbines in the landscape– because it may easily affect the character of the area that is considered the primary attraction for tourists (103, Frantal). Several studies on the cost and benefits of wind power for tourism show ambiguous results, highly determined by the kind of landscape and the kind of tourism (104, 105). An interesting topic is in particular the relation between wind power and tourism on island communities and also of near-shore wind power and tourism in coastal areas generally (106). It is not always clear whether the tourists really do not like the turbines of that this is primarily untested fear of the actors in the tourist sector. In some cases, there is evidence that wind turbines may add to the tourist value of remote communities as they are seen as emphasising the character of the location (86).

7.4 Fairness and trust

Having local benefits that balance the burden that the community has to bear –at least in their own view– is a question of equity and fairness that is typical of environmental conflict and decision making on infrastructure (83, 84, 107). These are questions related to distributional justice (How are costs and benefits shared?), fairness of process (Is there a fair decision making process that provides all relevant stakeholders with an opportunity to participate?), and trust (Are the information and the intentions of the investors and actors from outside the community trusted?) (108, 109).

These questions are strongly affected by the degree of collaborative decision making (Figure 3: 3). In cases where the wind farm project clearly generates community benefits the problems with community acceptance will remain limited. This often holds for different sorts of community ownership, but this will not be sufficient, in particular when the benefits are unequally distributed among the members of the community. Furthermore, the dimension of community involvement may also create feelings of (un)fairness if community members feel that the project is imposed on the community.

The 'utility wind farm', or any other project initiated outside the community, is clearly the model with the greatest probability of meeting distrust (110). In particular in policies that favours developments by large companies there is a tendency to include some prescribed compensation to generate community benefits. However, this is a dangerous strategy, as the intrinsic motivation of the community members with a positive acceptance can easily be undermined (111). Some practices of compensation in wind power cases show that the introduction of community benefits in case of a wind farm built by a community outsider may reinforce feelings of mistrust and it can easily be interpreted as an effort to bribe the opposition. Although community benefits, financial or otherwise, are presented as means of creating greater equity, experiences

with this kind of compensation of local burden to the community show that “even the most well intentioned developers may have a hard time earning the trust of local communities” (112).

8. Market acceptance

Social acceptance can also be interpreted as market acceptance or as the process of market adoption of an innovative STS. The literature on diffusion of innovation explains that the adoption of innovative products by consumers takes place through a communication and negotiation process between individual adopters and their environment (113). A technology like wind power is bound to infrastructure, such as the power grid, which makes it inherently more complex to diffuse this innovation than other products. However, using the insights from this literature, it is helpful to study market acceptance at the consumer level.

Consumers can, and in successful examples of implementation do, play a role as investors. They have participated in cooperatives or other civil initiatives – '*Bürgerinitiative'* in German– to establish wind farms and thus became shareholders. There is a wide range of motives for such initiatives, but a strong driving force behind this development were various grassroots initiatives (Figure 3) based on environmental concern and the willingness to be involved in the development of alternatives to conventional and nuclear power generation (82, 114). In the meantime, such civil initiatives have evolved into new energy companies with an inherent high degree of acceptance of renewables energy.

The alternative to investments by civilians in wind power, is the choice in their role as consumers to subscribe to any kind of ‘green power’ (115). Such labels are in fact a type of marketing strategy used by energy companies, generating power through a mixture of sustainable energy generation (30, 116). Most of these schemes include wind power, and consumers have the opportunity to switch to renewable energy supply without being actually involved in the physical generation. The ‘green power’ schemes are probably the area where market adoption is rather isolated from the broader social acceptance picture. A study from Sweden shows that rejection or acceptance of green power does not correlate with proximity to renewable power facilities (63). Nevertheless, if consumers would demand increased amounts of green power, wind farms would still need to be sited to supply this demand. The separation between (physical) supply and demand is inherent in the concept of green power marketing and trading, and it is a continuation of existing institutions in the power sector. The model is strongly favoured by the incumbents in the energy sector, similar to the support they provide to RPS systems. This might aggravate the problem of social acceptance, for example if there is high green power demand, but the energy companies are not able to generate sufficient socio-political and community acceptance for building the corresponding wind power production infrastructure. Extensive international green power trade, that might also be favoured by an internationally (e.g. EU wide) operating green certificates system, something that is strongly supported by Eurelectric – the European umbrella organization of the power supply sector– would reinforce such problems (73). It seems questionable whether residents of a country with large wind resources, such as Scotland, would be willing to bear the burden of the export of green power generated by many large wind farms. It would become a market model that would provide a ‘free rider’ escape for countries that scale-up the original 'backyard' concept to their entire nation (117, p.209) in which they do not opt to produce a sufficient amount of renewable energy within their own country needed for making the transition to a sustainable energy supply.

In a wider understanding of market acceptance, the focus is not just on consumers but also on investors and the structure of the economy. Examples of studies on market acceptance are for example the 'translation' of market stimulation and the effect of policy instruments as applied in Europe, in different markets such as the US. Bang et al. (118) emphasize the importance of the use of instruments that rapidly develop the domestic market for wind technology, in combination with incentives for using power technology that is manufactured locally. As the studies comparing the policies applied by different US states show, the socio-political acceptance of such measures is very different (49, 50, 53). Equally important is the acceptance on new but rapidly developing markets like China. There the relation between the development of a domestic market and the development of a wind turbine industry has been reversed. The market is working under a strong centrally directed development regime, including the obligation to use wind turbines built in China, and moreover strong institutional impediments exist with regards the effective inclusion of regional and local identity in the wind developments. Together with the fact that the general market is determined by set prices in cases of non-competitive contract wind farms, or in underbidding in cases of competitive concession projects, many wind farms are not embedded in the regional or local economy and they are often qualitatively low developments suffering from poor economic performance (119).

With all kinds of market systems, there is also the issue of intra-firm acceptance of renewable energy innovation. Numerous examples show that large firms are subject to path dependency when it comes to their investment behaviour. For the general picture of social acceptance, early market formation is an essential contribution to building the legitimacy of renewable energy innovation as a whole (120, 121). The issue of wind power implementation is also connected with the development of a wind power technology industry, as the existence and progressive development of a domestic market for application is the key to the development of this new branch of industry (122).

The success story countries developed a strong domestic market without large investments from existing energy companies. How social acceptance is constructed within existing energy companies would be an issue well worth studying. This could very well be linked to some of the research on cognitive barriers within firms with regard to taking up environmental and sustainability issues (123). Many of the energy companies still own and manage significant parts of the grid; even though, in some countries the grid management is subdivided in regional monopolies and is separated from power generation. The role, position and objectives of existing energy companies are a strong manifestation of market acceptance. In the Netherlands, the energy companies held a gatekeeper role and decided about the remuneration and grid access for more than a decade, whereas the German government forced power companies to accept competition from third parties (82). The latter factor is an essential feature of the success of the German 'feed-in' legislation and the Renewable Energies Act which effectively stimulated third parties to invest in wind turbines (115). It is clear, particularly from the position of the energy companies towards the REFIT and RPS support schemes, that they prefer systems that enhance their position in the market over the introduction of systems that stimulate third party investments in small-scale renewable power generation (67, 72). Moreover, there is a link with socio-political acceptance, because the incumbent energy companies are influential stakeholders in the development of energy policies and they try to use their influence in the crucial political decisions about the design of financial procurement systems, the access to the grid for other investors in renewable energy systems, and the introduction of green certificates trading systems (73).

9. Significant attributes connected to place identity

Numerous potential attributes of wind power application are shown in Table 2. Most of these with high relevance for socio-political acceptance are connected to issues concerning governance and institutional change, or they are general attributes of the of wind power technology, such as it's intermittent character. Some attributes come to the fore on the level of general application of wind power as well as in any specific case of building a wind farm. The way they show up in these cases, however, is very different. These attributes concern the impact that building wind turbines has on the environment, and these impacts are not primarily determined by the wind turbines itself or by the wind farm design. The impact is primarily determined by the existing local environment before establishing the development. Three categories of impact can be distinguished that are discussed in almost any case: landscape, wildlife, and annoyance.

9.1 Landscape/seascape

The attribute 'landscape' is by far the most significant in social acceptance. Attitude studies in the 80-ies and 90-ies already indicated that the discussions on the desirability of large-scale application of wind power focus upon the degree to which wind turbines can be integrated in the landscape (3, 4, 40). In most policy documents and in approaches of developers this weak spot is recognized, but the issue is poorly understood. In the realms of policy and developers it is usually narrowed down to 'visual impact' (36, 124). Two approaches can be recognized. In the first approach, studies try to develop instruments for visual impact assessment, and these tend to focus on the visibility as the determining factor (125). The second approach tries to include assessments of the public, but this approach is also meant to find generally applicable parameters of visual impact in order to quantify the corresponding impact (126).

With regards the issue of social acceptance, both approaches fail to address the essence of the landscape issue. The inevitability of the highly visual character of wind power is reason of the importance of the landscape issue, but the visibility is not the problematic impact itself. The visibility is making the landscape the most important – salient– attribute of wind power acceptance because it unifies three kinds of strongly varying elements. Landscape assessment of wind power varies, because:

(1) The landscape impact varies widely among cases, as the character of the landscape is very different at the locations;

(2) Within each landscape there are many distinguishable elements that may differently be affected;

(3) The valuation of the impact shows a wide variety among individuals: some can positively value landscape elements, whereas other individuals value the same element negatively.

Furthermore, the third factor of subjective valuation is also connected to the geography of the case, as local communities may differently assess similar landscapes because the identity of their community, including the landscape surrounding it, is historically and culturally determined. This is what is making the landscape issue highly subjective, and impossible to quantify objectively.

The notion of 'visual impact' almost automatically classifies the impact on the landscape as negative. This strong simplification can also be found among the minorities that oppose to wind power in general. In individual attitudes, the beliefs and valuation concerning landscape are the strongest determinants of attitudes towards the energy source wind power (40, 108). A clear example of this is the socio-cultural approach by Brittan (127) who uses a terminology that classifies wind turbines as

‘alien’ to the landscape, determining their unacceptability. He compares wind turbines to weeds, ‘invaders’ offending aesthetic values in a field of native flora: "To the extent that standardized machines are plunked down in a standardized way, then no matter who owns them, the local character of the community is thereby weakened if not also destroyed" (127, p.178). This is clearly the philosophy of a strong general opponent of wind power, but the quote also underlines the significance of landscape and place identity for this attitude (see Section 6.2).

In the late 1980s, the first studies that tried to establish the significance of arguments that inform attitudes to wind energy already showed that these attitudes primarily root in values concerning landscape (4, 40). Ever since, public perception studies as well as acceptability case studies show that attitudes mainly reflect the assessment of the acceptability of turbines in terms of congruency between turbines and the type of landscape in which they are sited (128-130). Despite the enormous variation that already exists between 'typical' national or regional landscapes, studies in different countries have shown that it is the type of landscape in which the turbines are sited that is the most determining factor in acceptance of wind power. This holds for onshore as well as offshore (131, 132). The idea that acceptability offshore will be higher and easier to achieve assumes that offshore wind power schemes would avoid the issue of destroying the landscape, which is again based on the simplistic idea that visibility determines landscape impact. Several recent studies show that the idea that building wind farms 'over the sea and far away' would solve the social acceptance issue is naïve (133, 134). Landscapes may also be ‘seascapes’ and these are also determining public acceptability, in particular since most offshore schemes are still near-shore.

Several studies of near-shore wind power have shown evidence that social acceptance is inevitably a topic and the crucial factor of the impact on the seascape has indeed come to the fore (135-137). Table 3 shows the impact of visual factors of a large proposed near-shore wind farm on the attitudes towards wind power development in the region. The variance in the acceptability could largely be explained by these visual factors, but in fact there were only two variables that described the character of the landscape that were important. Landscapes with ecological value are clearly negatively associated with siting wind turbines, but it is important to see that they are very positively associated with areas already in use for economic activities. All visual factors concerning the turbines and the way the wind farm would be designed did not significantly add explained variance. Hence, it is the qualification of the landscape that is the key to visual impact. Some cases show that the identification to seascapes with high iconic value –e.g. Nantucket Sound MA in the US and the WaddenSea in the Netherlands– has produced strong oppositional movements and eventually failing large wind farm proposals (43, 138, 139). These studies also show the significance of the concept of 'place identity', as the values attached to those seascapes are strongly associated with cultural heritage and ecological values, giving these conflicts a typical 'green on green' character (41).

The question that remains is how to handle the landscape/seascape issue. Any assessment of the congruence between local landscapes and a wind power scheme may be very subjective indeed, but nevertheless it is the number one issue that should be addressed in decision-making. There are two strategies to handle this issue that usually enhance the conflict, but that are frequently applied by developers and authorities. The first strategy is trying to 'objectify' the assessments by efforts to develop instruments for the objective assessment of visual impact (137). In a concrete case this was for example tried with an instrument of 'viewshed simulations' applied in the Nantucket Sound case ('Cape Wind') (138). A second strategy is to hire one of more 'experts' to finally decide what the visual impact is and this strategy was applied in the WaddenSea case by

calling in the official state's architect (139). In both cases the strategies failed, because these methods try to abstract the essence of the identity of the landscape, which is that it is primarily values that determine this place identity.

For any decision that addresses the identity of the landscape, it is crucial to apply a method that assesses landscape quality interaction with the new elements –the wind turbine– as it is actually perceived by the relevant viewers. By definition, landscape is the part of the environment that is the human habitat as it is perceived and understood through the medium of our perceptions (140). Apparently most developers and authorities alike do not like it, but these perceptions of landscapes are rooted in community values and history, and the only way to deal with them is to deal with the people holding these values. It is crucial to apply methods that assess landscape quality interaction as it is actually perceived by the viewers, because the value of the landscape is 'in the eye of the beholder' (141, 142). Together with the strong influence of the landscape issue on people's acceptability judgments, these observations all underline why collaborative planning strategies –see Figure 3– including cooperative and participatory decision making are crucial (42, 84, 87).

This applies to onshore wind, but also to offshore (136, 139) although the communities that are involved will often be different. For offshore wind farms a new practice of spatial planning at sea is emerging and similar to planning on land, the involvement of crucial stakeholders is essential (143, 144). Most of these are representing competitive uses of space at sea and coastal land uses that can be affected by near-shore wind development. To name a few: tourism, nature wildlife, shipping tracks, fisheries, oil and gas exploitation, national defence etc. Some experimental involvements of vested interests at sea are currently investigated, in particular the co-development of wind power with new ways of marine culture and commercial fisheries (145, 146).

Table 3. Support for wind power development in the entire region, explained by landscape type factors and design factors (108)
Standardized regression coefficients (β).

Landscape/design factor	**β**	**t**	**p<.01**
Landscape I character: economically applied area	.45	10.5	+
Landscape II character: nature, ecological value	-.28	-7.9	+
Landscape III character: residential use	.06	1.53	p>.1
Landscape IV character: offshore (North Sea)	-.03	-.14	p>.1
Wind farm Design I Large/small wind farms	.01	.33	p>.1
Wind farm Design II Small/tall turbines	.01	.23	p>.1
Wind farm Design III Small/large numbers	.04	1.10	p>.1

N=535; R=.66; R^2=.44.

9.2 Wildlife

Nature and landscape are strongly connected in perceptions. The strong commitment and tacit knowledge about the ecological qualities of the landscape are also shaping landscape perceptions within communities. This results in the 'green-on-green' character of many conflicts about wind power schemes as organizations founded for the protection of natural values and wildlife are often involved in questioning wind power developments (41).

Similar to the attribute ‘landscape’, the fundamental factors that determine the actor’s assessment of the attribute ‘nature and wildlife’ are the visibility and the identity of the location in the eyes of the community members. The fact that the casualties of birds are so visible is making the phenomenon inevitable for policy-makers, developers, and local decision makers. In terms of attitudes, with regards bird casualties we are dealing with beliefs about a 'salient' attribute (28; see Section 4.1). Efforts to assess the factual impact on avian wildlife are still not definitive. The impact is heavily dependent on what kind of species of birds (and similarly also bats) could be affected. Furthermore, the acceptability is as always not only depending on the factual impact of wind turbines on wildlife but it is also depending on similar impact of the alternatives to wind power (147). Hence, there is no doubt that there is some impact on avian wildlife, and even serious adverse consequence on some species, but in fact the impact of alternatives, in particular coal and nuclear power on wildlife (including the impact of power lines) is probably much stronger. The impact of hydropower is not primarily on avian wildlife, but its impact on fish and river ecosystems in general seems very high, but how should this be compared to the impact of wind turbines on some species? Because of the high visibility, wind power is vulnerable to a more negative profile than hydropower has in regard to its impact on fish. The high visibility of wind turbines and of eventual casualties is making this impact a serous problem with regard to the acceptance of wind turbines at certain locations.

The impact on birds is mainly connected to the location. The presence of birds is obviously geographically determined –due to breeding grounds, migration routes etc.– and these are fairly objective factors, but the social valuation of the impact depends heavily on how the affected species are valued. These are species that are already rare and endangered, but also species that enjoy a valued status as icons of certain places, for example the sea eagle, a bird with high iconic value that has spurred discussion about the closing of an existing wind farm in Norway (148). The strongest valuation is again connected to the characteristic presence of certain species or of entire ecosystems in which these species are essential elements. The presence of such species can add much to the identity of certain locations and then it will strongly affect the acceptability in the eyes of the communities that strongly identify with the place, such as nature protection organizations.

In the collaborative decision making the discussion may be focused upon accepting the building of the wind turbines at the site or to select another site. It may also concern the way of siting the wind farm, whereby specific characteristics of the living patterns of the birds can be used to redesign the wind farm (149). The impact on wildlife is not the strongest factor in determining attitudes to wind farm developments, but the issue is closely linked to question of place identity and in particular landscape identity (see section 7.2). Hence, for social acceptance it is very important that the issue is addressed in the collaborative decision making process by means of participation of the organizations representing the interest of nature and wildlife.

9.3 Annoyance: noise

The local impact of wind turbines is often described in terms of annoyance. For example, the visibility of the turbines is sometimes referred to as visual annoyance or intrusion. As described in section 9.1 this description is mainly determined by valuation. The most serious sources of annoyance are shadow flicker and the sound produced by wind turbines. The valuation of that sound is usually referred to as ‘noise’, a term with a clearly negative connotation. Shadow flicker is very severe indeed, but it can be avoided because the places where the moving shadows appear can easily be calculated (151). The perception and experience of noise, however, is a very complicated matter.

Noise has been addressed from the early 80-ies onwards as a serious issue concerning wind turbines. Technology development has reduced the production of sound by wind turbines, but simultaneously the size of the turbines has increased. In decision making about the siting of turbines, noise can play a significant role. In the collaborative process, the issue of sound produced by the turbines should be taken seriously. However, this does not mean that the expectations about noise annoyance are primarily determined by the sound of the turbines. The first study on the relation between the actual sound pressure produced by wind turbines and annoyance was carried out in the early 90-ies when the number of people living close enough to wind turbines to be seriously affected was rather limited. This study in three counties found that the level of annoyance among surrounding residents was stronger affected by attitudes to the wind turbines than by the factual sound pressure (152).
This phenomenon has been replicated in a more sophisticated noise annoyance study. It combined on site physical measurements of sound pressure with adequate measurements of all relevant variables to annoyance among residents on several locations in Sweden. In that study, the strongest influence on annoyance was from two attitude variables concerning wind turbines in general and to the visual impact of the wind turbines (153 p.484). In a second study these relations were specified in a model and tested, and the result is shown in Figure 4 (154). The figure shows that there is a positive correlation between dB(A) sound pressure levels and annoyance, but noise annoyance is much stronger related to the visual attitude. This visual attitude has been measured with indicators as the impact on the landscape, a judgment in terms of beautiful or ugly, and a judgment about natural versus unnatural. As usual this attitude is in turn strongly related to the general attitude to wind turbines, measured in terms of general opinion, efficient power generation, and necessity. Figure 4 presents the results for those residents that could see at least one wind turbine. There were no differences between rural and built-up areas, but the relations became weaker on locations with hilly or rocky terrain and among people that could not see any of the wind turbines. The study shows that even for noise annoyance, which is about the sound that is produced by the turbines, the landscape issue is still a more important attribute than the sound itself. This finding reinforces the overall dominant significance of landscape for acceptance of wind turbines.

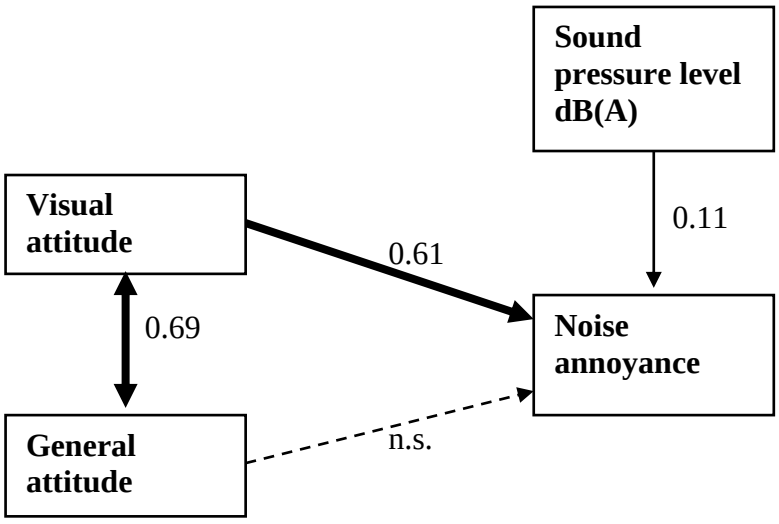

Figure 4. Structural equation model (source: 154 p.384) presenting strength of paths explaining noise annoyance for residents who could see at least one turbine (N=843).

10. Future directions

The issue of social acceptance of wind power will come to the fore even more prominent in the coming decades, but the character of acceptance issues in the three dimensions will probably change. In the coming decades the problems concerning the institutional constraints for the emergence of a new STS in its early adoption phase will gradually shift towards the social acceptance of interconnected sustainable energy systems in which wind power is only one of the substantial components. It will no longer be an issue of introducing a new kind of energy supply, but of implementation of sufficient capacity of renewable sources required to establish a full transition towards sustainable energy supply. In all three dimensions of social acceptance new problematic issues will emerge because of the enormous requirements in the amount of space needed to establish that capacity. This is considerably underestimated in policy –as well as the rest of the society– in particular with regards the power-space ratio in relation to the energy consumption in developed countries. This ratio shows the impressive amounts of land use change needed (108).

The current awareness of the required space for sustainable energy supply is still limited and, hence, the consequences in terms of landscape occupation and potential environmental conflicts are neither fully recognized. One of the major changes that is recognized though, is the potential rapid development offshore. This constitutes a major new challenge, but as indicated –section 9.1– the issue of social acceptance may be different there because of other competing spatial claims and key stakeholders, but this definitely does not result in less complexity in decision-making. Again, a collaborative approach to decision-making is needed to handle these complexities in a way that furthers acceptance among the crucial actors.

The essential role for collaborative planning approaches to wind power emphasizes the role of communities. This line of practice will only become more important because of the number of wind power projects and therefore the number of communities that need to be involved. There should be no misunderstanding though, that the complexities of the realities of community can easily be underestimated. Although most acceptance studies reveal that the role of communities is essential, there should be no presumptions about communities that they are always benign towards sustainability (155) and their willingness to further the development of renewable and sustainable energy cannot be taken for granted. A comparison of different cases of community energy has shown that community support for wind power projects, even if they are rooted in parts of the community, is definitely not self evident. This analysis concludes that "trust between local people and groups that take projects forward is part of the package of conditions which can help projects work and for local people to feel positive about getting involved and about process of project development" (156, p.2662). However, there are no simplistic prescriptions of ‘what works’ and community wind power projects cannot simply be replicated from place to place. Again, the essence of the implementation of a new STS in a community is that understanding the social context of innovation and technology diffusion is just as important as its technical dimensions. Studies that enhance our understanding of how to embed renewable energy supply in communities still have a short history, and the understanding is still limited.

The most significant aspect of collaborative decision-making about and community acceptance of wind power projects is the fit to the identity of the landscape in the eyes of the community members. Within the socio-political acceptance dimension there is a persistent preference for efforts to try to avoid the far-reaching subjectivity of 'the eyes of the beholder' (141). The efforts to develop of technological instruments to objectively

assess the 'visual impact' will not enhance trust, as they are not helpful to address the valuation of landscape identity. A more fruitful direction for the analysis of the landscape issue with newly developed technological instruments is where such techniques are applied to support the collaborative planning process of wind power schemes. Recently some studies have shown considerable progress in that direction (157, 158).

The main question of social acceptance will remain how to build socio-political and market acceptance for the collaborative way of planning and decision making that is needed. This key to the large number of positive investment and space-making decisions will even become more important because wind power is becoming increasingly part of an all-embracing STS of integrated sustainable energy supply. The new power supply system will have to integrate growing numbers of distributed generation units (26, 159). This STS may include several components, such as solar PV, small-scale CHP, tidal, geothermal, and hydropower, and all of these are subject to questions with regard social acceptance (160). Furthermore, the increasing amount of capacity with an intermittent character is adding new challenges to the power grid, which in the current situation is considered storage capacity for sources like wind power (161). For socio-political acceptance, this development asks for willingness to invest in the development of a new STS based on a power grid that can handle the increasing tendency of distributed generation and decentralized optimisation (162).

The integration of all the components of sustainable power generation, including the mutual fine-tuning and optimisation of local supply and demand and possibly with the introduction of local storage capacity –e.g. electric vehicles– must be embedded in a 'smart grid' (163). All the new technologies needed for this integration will become subject to acceptance decisions, as incumbents in the existing power sector should institutionally support them in policy and, and they need willingness to investments by many market actors including the acceptance by consumers. The issue of community acceptance will come to the fore more prominent as well, as we are dealing with more distributed generation that by nature depends largely on decisions on that level. The future 'smart grid' will probably something like "a network of integrated micro-grids that can monitor and heal itself" (163 p.570) in which the micro-grids are in fact connecting communities of consumers that partly have become producers themselves – or co-producers– and mutual suppliers. All questions of (co-)ownership and involvement in decision making that have come to the fore as crucial in wind power development will become more complex. They become embedded in questions about ownership and about who will be in control of all the facilities that are part of the new supply system, which in particular includes the smart meters and smart regulating devices that will be the hubs of the smart micro-grids. The social acceptance of wind power will become embedded in the acceptance of all kinds of decisions about this future STS of sustainable energy supply and demand.

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