The research on public perceptions toward wind power schemes: An analysis through the 'eyes' of sustainability

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Theodoros

Abstract

Climate change and its potential impacts to the future of our society is arguably one of the most challenging issues of our time. The use of fossil fuels for energy production has been identified as one of the main reasons that enhance earth's greenhouse effect and cause the changes in climate. In terms of electricity production the conventional power plants which burn oil or coal are considered the major contributors of greenhouse gases. Renewable energy sources and wind power in particular are considered the major future contributors to the effort of the nations in the EU to mitigate the respective emissions. Despite the overall high acceptance of the wind power idea within the EU, there are implementation difficulties for many wind power projects, mainly due to opposition from the public. The research that attempts to identify the reasons for this situation has been substantial and its purpose is to assist future developers and policy makers. The thesis consists of an analysis of more than 35 studies on public perceptions toward wind power. The patterns followed by the researchers were identified and the methods applied were evaluated. The issue of public opposition toward wind power implies a conflict between fundamental principles of the concept of sustainable development such as environmental and social sustainability. The thesis examines whether these principles are being addressed in the research regarding public perceptions. It suggests the paradigm of sustainability as a possible theoretical framework for future studies on wind power implementation.

Keywords: Wind Power, Implementation, Public Perceptions, Sustainability

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1. Introduction

The exploitation of wind by humans has a long history of thousands of years. Milling grain, pumping water and other mechanical power applications are some of the human activities that were supported by wind, even during modern times (Boyle 2004:244).

The use of wind power for production of electricity was initiated in the early 20th century. However, the popularity of this method of electricity production has increased in the last two decades, due to the rapidly emerging issues of climate change and insecurity of fossil fuels supply.

The number of installed wind projects in the countries of the EU has been significantly increasing during the last decade. At the same time, implementation problems have been reported in several areas, constituting this increase in unevenness between countries or specific areas. One of the main identified reasons for this uneven development has been the reported public opposition against wind power projects in various cases. Following the need for better understanding of the problem, the research on wind power implementation problems and on public perceptions has increased substantially.

This paper analyses the research on public perceptions and evaluates its contribution to the comprehension of the problem by the involved parties; policy makers, developers, citizens. Sustainable development is a popular, contemporary paradigm that advocates the incorporation of multiple aspects of a society in order to efficiently confront a problem. The paper expands the analysis and observes the problem and the consequent research through the 'eyes' of sustainability. Suggestions on how the research on wind power implementation can increase its efficiency are made, based on the assessment of the reviewed literature and with the perspective of sustainable development.

2. Background

2.1 Climate change

2.1.1 Definition- Need for Solutions

Climate change and its impacts on the current as well as the future societies is arguably one of the most discussed global issues of our time and at the same time one of the world's critical environmental problems (Carter 2001:1). The term 'climate change' or 'global warming', as it is met in the literature, is in reference to the rapid change of earth's climate since the middle of the 20^{th} century. Describing the causes of this phenomenon, it is mostly attributed to the enhancement, by human activities, of the originally natural greenhouse effect (Elliot 2004:79-80). The greenhouse effect, being a natural process, occurs due to the presence of particular gases in the troposphere such as carbon dioxide (CO_2) and methane (CH_4) (Miller 2005:462-467). The problem of climate change is being created when human activities result in the increase of the concentrations of the above gases in the atmosphere and therefore intensify the greenhouse effect (Ibid.). This happens mainly due to extensive use of fossil fuels, deforestation and growth of livestock by humans (IPCC 2007). It is estimated that atmospheric concentrations of CO_2 have increased by 31% since pre-industrial times (Ibid).

The reports on climate change produced by the Intergovernmental Panel on Climate Change (IPCC) have been largely acknowledged regarding the validity of the greenhouse gas measurements and the impact of human activities on the increase of the gases' concentrations. However, ambiguities have been observed in the actual effects that climate change will have on earth in the

long term. This reality is common when scientists attempt to produce projections for the future using complex mathematical models (Hall et al 2007). Nevertheless, there is *a high level of ecological scientific consensus* that the no-climate-change scenario is not likely in the future. Phenomena such as increases in average global temperatures, rise of sea levels and increase of the frequency and intensity of extreme weather conditions have an extremely high probability of occurrence by the year 2100, regardless of their exact magnitude (IPCC 2007;Carter 2001:232-237). The diversity of the present scientific viewpoints on how severe the effects of climate change will be for the planet has inevitably led to a diversity of attitudes on how the problem should be approached.

2.1.2 Conventions on Climate change-The Kyoto protocol

Despite the lack of consensus regarding the actions required, or not, to mitigate climate change, there has been some important progress on the international political level in the form of conventions and agreements. *The formation of IPCC* and its work, although often criticised, has been probably the most important step toward a scientific consensus. Its latest assessment in 2007 is the centre of attention in the international political scenes and triggers future environmental policies. *The UN Framework Convention on Climate Change (UNFCCC) of 1992* addressed principles such as precaution, equity, cooperation and sustainability. Despite its vague and non-binding authoritative targets, it founded the institutional mechanisms that would lead to future actions based on the above principles (Elliot 2004:84-87).

Particularly important for the purposes of this study is the *Kyoto Protocol*, which followed the second IPCC assessment of 1995 and was adopted in 1997. Its basic provisions are that developed countries and those undergoing a transition to a market economy (Annex I countries) should decrease their GHG emissions by 5, 2% below 1990 levels by 2012. For the countries of the EU the overall target is an 8% decrease (Meyer 2003). The Kyoto Protocol includes restrictions for six types of GHG and provides incentives such as emissions trading schemes that allow countries to achieve reductions by trading emission permits with other Annex I parties (Elliot 2004:87-89;Carter 2001:235). Despite the criticism on its potentially minor contribution to the mitigation of climate change, the Kyoto Protocol has still been ratified by more than 120 countries including the countries of the EU (Cunningham& Cunningham 2006:212). This fact confirms that the Kyoto Protocol is considered a ‘major step forward’ (Ott 1998, cited in Elliot 2004:89) and its provisions will be regarded as implicit for the following analysis.

2.1.3 Methods on confronting climate change-RES

According to the scientific research, fossil fuels (oil, coal and natural gas) represented nearly 80 per cent of the total global primary energy use for 2001(UNDP 2004:28). The respective percentage for electricity production is more than 60 per cent and, at the same time, the combustion of fossil fuels for electricity production leads to CO_2 emissions that, despite their small global warming potential, are considered as the biggest contributors to greenhouse effect (UNDP 2004:40-42).

The main focus of the international policy makers has been set to the reduction of the CO_2 concentrations in the atmosphere through the promotion of clean technologies for electricity production. The shift of the electricity production toward Renewable Energy Sources (RES) has until now been the most common way to attempt that, for a number of additional reasons apart from the reduction of CO_2 emissions. Their main advantages include the increased flexibility of electricity systems, the creation of jobs, the diversification of energy sources and the reduction of

dependency in imported fossil fuels (Szarka 2004; UNDP 2000:221-222). Traditional RES such as hydropower, or 'new renewables' such as biomass, wind, solar, geothermal and tidal energy systems have been applied for electricity production with different rates and efficiency. Among these, *wind power is arguably considered the most rapidly emerging technology*, with the costs per MW produced being on a similar level as the ones of conventional power sources (SDC 2005; Zervos 2003).

2.2 Wind Power

2.2.1 Basic Facts

The first samples of electricity production from wind energy occurred in the early 20th century; however only since 1980s has the technology started becoming sufficient to support electricity production in a high scale (Boyle 2004:244). By the end of 2003 the ten-year average annual growth rate of wind power was 30% with 40000 MW of global installed capacity, with Europe contributing to two-thirds of this value (EWEA 2003). The modern instrument that is being used to convert wind energy to electricity is a wind turbine; most commonly a horizontal axis one with two or three blades (Boyle, 2004:244.) The optimum aim of a wind farm developer is to increase electricity production and simultaneously minimize infrastructure and maintenance costs as well as the local environmental and socioeconomic impacts (UNDP 2000:294-295). Another factor that is essential for successful penetration of wind power in the market is its efficient integration into the existing electricity transmission grid (EWEA 2003).

2.2.2 Wind Power in the EU-Targets-Support Mechanisms

The potential contribution of RES to the mitigation of GHG emissions has been anticipated as significant in the EU policy-making mechanisms. In 1997, the European Commission's White Paper on RES set a target of achieving 12% penetration of the renewables in the Union's energy production sector (EC 1997).This target had an immediate effect on the electricity sector. The 2001 EU Directive on promotion of electricity from RES illustrates this and it followed the gradual liberalisation of energy markets that was initiated in 1989 (Meyer 2003). According to the directive, specific targets are being set for each country regarding the contribution of RES to the total electricity production. *The EU's overall target is the increase of RES share from 14% in 1997 to 22% in 2010(EWEA 2003). Wind power is expected to have a significant contribution to this increase and it has been promoted accordingly on the legislative level (Zervos 2003).* Financial support mechanisms and incentives are being applied through legislation in the different countries of the EU, aiming at attracting investors. These incentives can be categorized in fixed price and fixed quantity systems (EWEA 2003).

2.2.3 Implementation differences within EU- Public attitudes

Despite the variety of support mechanisms and the increasing need for RES, the investments and the installed wind power capacity has not been similarly increasing in all countries. Investors are faced with *a series of barriers* that would potentially delay or postpone a wind farm project. The demand for wind turbines as well as the cost for the installation of a project could be fluctuating for different countries, while policy issues, measures applied, as well as bureaucracy might delay significantly the completion of a project or reduce its cost efficiency (Åstrand & Neij 2006;UNDP 2000:234-235). Differences in institutional circumstances and social reactions against wind power

have resulted in obvious differences in the implementation efficiency of wind power for countries of the EU that have similar financial support mechanisms. For instance, for the period between the years 2005 and 2006, the increase of installed capacity of wind power for two countries using feed-in tariffs, such as Germany and the Netherlands, was 2233 MW and 356 MW, respectively (EWEA 2007). Despite the admittedly large development of wind power in the EU, 7611 MW of installed capacity for the same period, there are currently only two countries, Germany and Spain, which manage to overcome any obstacles and increase the exploitation of their wind resources (EWEA 2003). It should not be underestimated that the wind potential differs for each country; however the observed differences in their installed capacity increase rate cannot be attributed only to this factor (Toke et al 2007; SDC 2005; EWEA 2003).

Public attitudes

A key reason for the successful implementation of wind power is the public acceptance of it in the area of interest (EWEA 2003; UNDP 2000:235). The role of public attitudes toward wind power in general as well as toward the wind parks can be characterised as critical for the successful implementation of this green technology. Thus, it has been largely considered by investors and policy makers. According to many research studies, based mainly on opinion surveys, *the wind power acceptability throughout Europe is fairly high*, especially when compared with conventional power sources (EWEA 2003; Krohn & Damborg 1999). *However, this does not imply that the implementation level for each country is proportional to that acceptability.*

It is obvious that the issue is not whether wind power is accepted throughout the EU as a concept or whether the public is informed about its environmental benefits, as many of its supporters would claim. I*t is rather an issue of what drives the observed opposition of wind power projects in a large number of cases in Europe* and consequently halts the increase of the respective investments (Devine-Wright 2005; Wolsink 2000).

The main reasons that create a perceived social opposition derive from the objective practical impacts that wind power has on various aspects of the specific site of interest. The basic impacts that wind parks have on a location's environment are *the aesthetic or visual ones, the noise disturbance, disruptions on land and bird life as well as electromagnetic interference* (SDC 2005; Boyle 2004: 270-277;EWEA 2003). The majority of these impacts have been arguably moderated, considering the improvements in technology and location selection for establishing a wind park.

In particular, **noise** is rarely considered an important factor of annoyance as long as the standard specifications of wind turbines are being followed and when they are installed in considerable distance from properties (SDC 2005). For that reason, any reference to noise as a negative impact of wind parks is often a result of misled information or perception rather than a result of personal experience (EWEA 2003). Regarding the **impacts on bird life and habitats**, it could be observed that it is a case-specific issue rather than a general phenomenon. Therefore, a thorough planning procedure that accounts for the sensitivities of an area regarding its habitat should be considered as a way that mitigates this negative impact of wind power. Similarly a careful planning procedure in association with the broadcasting companies can prevent possible wind turbine **interference with television electromagnetic signals** and consequently constitute this factor as a minor negative impact of wind power development (SDC 2005; Boyle 2004; 270-277). **The aesthetic or visual impacts** of wind power are arguably the most difficult to mitigate, mainly for the reason that whether they can be considered as negative impacts or not, is dependent on subjective criteria. The visual impact of wind turbines or parks can not be calculated and every citizen of a selected site may have a different perception on how a wind turbine affects the landscape or even his personal aesthetics (SDC 2005; EWEA 2003). For that reason, it is doubtful if a design or location solution that can satisfy all members of a community can be found.

3. Purpose

Considering the aforementioned parameters, the necessity of the further development of wind power is being highlighted by the majority of the policy makers and investors throughout the world. Accordingly, the amount of research being conducted on all factors that affect this development has been substantial, covering many aspects such as cost-benefit analysis, technological improvements or statistical assessments of wind power's impact on specific landscapes and societies. Similarly, *the research on social perceptions toward wind power has been extensive and its target has been to analyse the different parameters that comprise this aspect of wind power's implementation procedure*. **The purpose of this paper is to analyse the research on public attitudes toward wind power for various cases and countries.** The basic parts of the study will be the discussion of the various findings, the different considerations taken and the evaluation of the methods applied. The study will provide proposals of additional approaches to conducting research in this particular field. The process of assessing the current research on social attitudes against or in favour of wind power will be carried out following the fundamental paradigms of sustainable development. An evaluation of whether the research on social perceptions approaches the problem according to the general discourse of sustainability will be accomplished and further conclusions and suggestions on how this concept can be considered when conducting such research will be provided.

In order to demonstrate the reasons that constitute this study as significant, a systemic illustration of the topic is presented and the cause-effect relation of the corresponding factors is analysed. The Causal Loop Diagram (CLD) of the Figure 1 *does not include all the possible variables* that can be related to the issue of wind power implementation. However, it shows how the research on this issue relates to the actual implementation of wind power projects and, consequently, to climate change. The arrows in the figure illustrate the causative relation of one variable to the other. The plus (+) symbol indicates that a change in the status of one variable creates a change in the same direction of the status of the affected variable. For instance, an increase of climate change will lead to an increase of the need for RES. The minus (-) symbol indicates that a change in the status of one variable will lead to a change in the opposite direction of the status of the affected variable. For instance, the more rapid the mitigation of greenhouse effects is, the less the occurrence of climate change. Therefore, as it can be observed, the increased need for RES (1) led to an increased

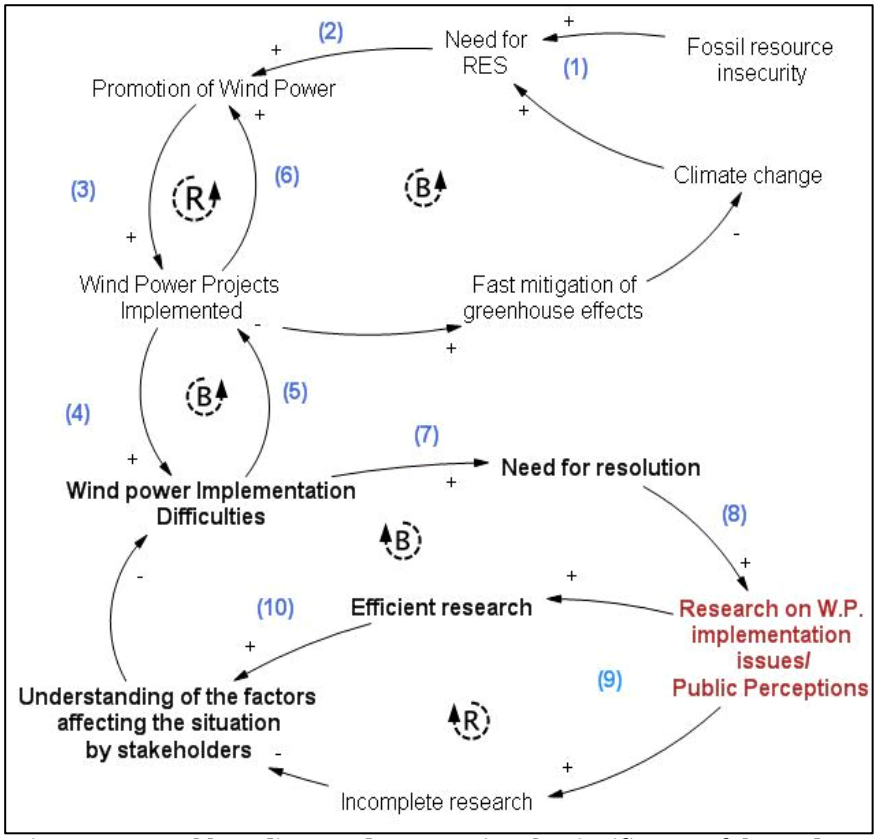

Figure 1 :Causal loop diagram demonstrating the significance of the study

promotion of wind power (2), which in turn led to an increase of the implementation of wind power projects (3). However, the rise of the number of implemented projects is one of the reasons that led to an increase in the emerging implementation difficulties (4). As it is illustrated, an increase in the implementation difficulties of a project decreases the number of wind power projects implemented (5) and, consequently, the promotion of wind power (6), since alternative solutions are expected to emerge. As a result, the increase in the wind power implementation difficulties created an increased need for resolution of those difficulties (7), which eventually led to the observed increase of the research on wind power implementation (8). The reason that this study is important is that, as illustrated, the increased research on public perceptions results in an increased amount of efficient research as well as an increased amount of incomplete research (9). *Therefore, the study aims at evaluating the characteristics of the studies and distinguishing their positive and negative characteristics.* In that way, suggestions can be made regarding the ways in which the number of efficient studies can be increased. Consequently, the understanding (10) of the factors that affect the situation can be improved. Finally, an improved understanding of the corresponding factors will eventually lead to a decrease of the implementation difficulties.

4. Limitations

In order to proceed to the theoretical considerations of the study and to the further analysis of the research in question, it is important to clarify the limitations of this task.

- *The study will be limited to the research carried out within the EU.*

  This is due to the fact that there is a homogeneity observed among the countries of the EU regarding their authoritative will to develop wind power. Many other countries worldwide, for instance, the US often presents variations in the level of considering wind power as a main alternative power source for the future, both in the public as well as in the governmental sector.
- *The study will focus on the research done on implementation of **onshore** wind power projects.*

  The reason for this limitation is that offshore wind power development is currently in a premature developmental stage and as a result the respective research on public perceptions on this type of development is not currently adequate for efficient reviewing.
- *The study assumes that onshore wind development is an economically viable solution in comparison to all other alternative electricity production methods.*

  The question of whether a wind power development is economically efficient or not for a specific case would require extensive analysis contrary to the purposes of this study. Moreover, the, on average, comparable costs that wind power production has in comparison to other sources of electricity allows for an extension of this fact to all studied cases. Therefore, the implementation of wind power projects for a specific case of the study will be implicitly considered as a desirable solution from an economic point of view.

5. Theory- Sustainable development

5.1 Definition- Development of the concept

In order to analyse the correlation of the public perceptions towards wind power with the concept of sustainable development, it is essential to define and discuss the basic principles of this rapidly evolving idea. Sustainable development can be referred to as the latest and more mature stage of the environmentalism movement which started in the early 60's, or even as an attempt to reframe the traditional ecological problematic (Jamison & Hard 2005:288). Although the term sustainability was initially introduced in the early 80's, referring to either ecological or economical

development, it was in 1987 with the report titled "Our Common Future", also known as the Brundtland report, produced by the World Commission on Environment and Development (WCED) where the term was initiated and popularised worldwide(Carter 2001:195-196). According to this report, sustainable development was defined as *"development that meets the needs of the present without compromising the ability of future generations to meet their own needs"* (WCED 1987:43). It can be argued that this definition is rather vague and can have multiple interpretations, however it is beyond any doubt that it set the foundation for a developmental shift from traditional environmentalism to a development that incorporates economic and social aspects along with the environmental ones(Carter 2001:198).

Indeed, the WCED report was used as a factor for debate at the UN Conference on Environment and Development(UNCED) that took place in Rio in 1992 and sustainable development, although not redefined, was considered *a common goal*(Elliot 2004:161). The basic agreements that were adopted concluding the UNCED were the Rio Declaration, Agenda 21 and the statement of Forest Principles, while the UNFCCC was initiated at the conference as well (Ibid 17). The Rio Declaration summarizes in 27 principles the goals of future human development under the concept of "new and equitable global partnership". Issues such as eradication of poverty, public awareness or world peace are being addressed within the principles of the Declaration, however it was largely admitted that this list of principles did not provide extensive guidance on how to achieve sustainable development (Ibid 19). Agenda 21, on the other hand, provided important and detailed guidelines on implementing the principles stated by the Rio Declaration. It can be characterised as the "blueprint" for applying sustainable development and it covers in forty chapters a series of environmental and development topics (Carter 2001:196). Despite its non-binding character Agenda 21 was approved by more than 170 nations and by the mid 1990s most of the developed countries had initiated national sustainable development strategies while many local authorities had launched local Agenda 21 Strategies. Additionally, the Commission on Sustainable Development (CSD) was created by the UN in order to monitor and promote the implementation of Agenda 21 by the governments and local communities, however without having any legal authority over the respective states (Ibid).

It can be concluded that Agenda 21 set a commonly accepted framework for promoting sustainable development; a beam of guidelines supported by the majority of the world's nations that would have under their responsibility the corresponding implementation procedures.

5.2 The pillars of Sustainability

Analysing the fundamental principles of sustainable development it can be argued that they are classically divided into three or, according to some authors, four categories. The most common way of analysing the concept of sustainability is by breaking it down to its environmental, social and economic sides (Bell & Morse 2003:3; Harris et al 2001:xxxiii). Therefore, sustainable development would be defined as *the interface between the three respective "pillars"*. Defining the basic principles for every aspect of sustainability can be a misleading procedure due to the obvious broadness of the each concept. However some provisions of "*common sense*" can be anticipated throughout the literature, being consistent with the principles stated by the Rio Declaration and Agenda 21.

1. The main characteristics of *environmental sustainability* would be the conservation of resources, the maintenance of biodiversity and atmospheric stability (Bell & Morse 2003:4). In other words, in order to follow the principles of environmental sustainability, the exploitation of resources should be avoided; at least to an extent that allows those to be replenished in a similar

rate to that at which they are being exploited (Harris et al 2001:xxix). Moreover, sustainable yield and the carrying capacity of a system are parameters that need to be considered in order to achieve environmental sustainability (Bell & Morse 2003:4).

2. The aspect of community development or the *social "pillar" of sustainability* involves principles such as local self-reliance, satisfaction of basic human needs, equity and social accountability (Ibid). Moreover, social sustainability is being approached in communities where health and education services are adequate as well as when gender equity and participation are prevailing elements of the respective system (Harris et al 2001: xxix).

3. *The economic aspect of sustainability* addresses traditional economic development targets such as economic growth, maximisation of private profit and the expansion of the market (Bell & Morse 2003:4). In more specific terms, in order to achieve economic sustainability a system should be continuously able to produce goods, while the government and external debt levels should be minimized and the agricultural and industrial production should be promoted (Harris et al 2001:xxix).

4. *A fourth aspect of sustainability* often referred to in the literature is the *institutional* one. Although not specifically addressed or implied in Agenda 21 as a dimension of sustainability, it was anticipated that an element of institutional management was necessary in order to fulfil some of the environmental or socioeconomic provisions of Agenda 21(Spangeberg 2001). In that way, the institutional "pillar" of sustainability can be characterised not as a "stand alone" dimension but as an implicit factor required for the successful integration of the other three pillars; therefore it should be always taken under consideration when assessing and constructing sustainable development strategies.

5.3 A Critique on Sustainability

Considering the above analysis of sustainable development it can be argued that it represents ideas that could be interpreted as "common sense" by the majority of the contemporary communities. However, despite this general acceptability of the concept, sustainability is also being criticised and challenged regarding its specific content and the ways that it can be implemented (Elliot 2004:163). The foundations of compiling a critique on sustainability can range from challenging the fundamental principles of it to questioning its long-term success as a development idea. One of the main reasons for this wide range of criticisms is the multidimensional character of the idea which automatically raises difficulties on, for instance, which aspects or pillars should be prioritised and when their interaction can be characterised as successful (Harris 2001:xxix). Indeed, the basic definition of sustainable development, even after its further clarification within Agenda 21, consists of many ambiguities and controversies on many issues. For instance, using economic growth for protection of the environment and reduction of poverty rather than focusing on the deeper causes of the phenomenon (Elliot 2004:162-166). *A second area of critique* against the concept of sustainability is regarding its exploitation from institutions or individuals that often need a popular word or title under which they wish to serve their interests. Deriving from its aforementioned ambiguous character *sustainable development has in many cases become a "buzzword largely devoid of content"* as Esty notes, quoted in Elliot (2004:162). This usurpation of the idea inevitably leads to a gradual devaluation of it and it often raises the necessity of better defined boundaries of applicability in order for it not to be quoted as an "empty political slogan" (Carter 2001:201).

Following this emerging danger, several attempts of refining the definition of sustainable development have been made; for instance the division of sustainability to weak and strong, whereas the former refers to formal policy integration and substantial restructuring of

microeconomic incentives while the latter addresses binding policy integration and full valuations of the cost of living(Ibid). Whether there is a need of reformation or narrowing down of the definition of sustainable development is still an issue of argumentation. While policy makers, economists and environmentalists would rather have a clarified concept under which they will be able to accordingly implement their ideas, there is always the counter argument that such a constriction of sustainability would prevent a number of communities to commit themselves to its principles. Indeed, the main advantage of the notion of sustainable development is its "common sense" spirit, similar to the incontestable ideas of democracy and justice. Being, "like beauty, in the eye of the beholder", sustainable development is an idea that has a "universal appeal" and consequently a sometimes irrational but certainly substantial potential (Ibid, 199-203). A fact that demonstrates that argument is that, currently, there are many examples at the governmental and local levels, where the decision making mechanisms have changed their ways of operation and have found common grounds of cooperation under the same target of achieving sustainable development (Ibid, 202).

5.4 Further analysis of the concept-Five important principles

The division of sustainability in the three or four integrating 'pillars' constitutes the process of analysing a contemporary issue of society as a less complicated procedure rather than considering sustainable development as a single idea. However this kind of division would not prevent of a number ambiguities and contradictions throughout such an analysis. For instance, when applying a renewable energy policy in a country it would be complicated for someone to distinguish whether environmental sustainability is achieved and when that happens, what would be the case with the other two aspects. In that sense, it would be preferable to break down even further the concept of sustainable development by pointing out fundamental ideas or principles that are addressed in the Brundtland report and Agenda 21. According to Carter (2001: 203-209), the five core principles of sustainable development are: *equity, democracy, the precautionary principle, policy integration and planning.*

- The term "*planning*" does not imply any form of case specific planning, such as spatial, but the arrangement and commitment on a generic plan to implement sustainable development. As it is stated in Agenda 21, sustainable development strategies should be planned on all levels of governance, not necessarily in the form of state planning but with the inclusion of the maximum amount of stakeholders (Carter 2001:209). Moreover, there is need for a plan designed and coordinated by the governments that would evaluate and propose the required policy instruments for the specific cases.
- In order to achieve that, there is an additional requirement of *policy integration* between the respective sectors of a society. This is a factor that complies with the institutional aspect of sustainability. As it was stated in the WCED report, the objective of sustainable development would pose difficulties among institutions with conflicting interests and therefore one of the biggest challenges of this idea would be to discover ways to overcome these problems (Ibid 208-209).
- The critical role of *equity* for the achievement of sustainability is explicitly defined in the Brundtland report. First, the importance of *intergenerational* equity is obvious in the initial definition of sustainable development with the reference to future generations. Secondly, *intragenerational* equity, that is equity between different nations or between societies of the same nation, is mentioned as an important factor for sustainability. For instance, the importance of "social and economic justice within and amongst nations" is being addressed in the WCED

report (Ibid 203). Moreover, the achievement of this goal is a prerequisite for a successful long term intergenerational equitable development (Ibid). The societies following the principles of equity have the responsibility of preserving the planetary system in a state that would be deemed acceptable by the future generations (Elliot 2004:146). However, the rules and policies that need to be identified in order to share the earth's resources in an equitable way will depend on assumptions regarding the future generations' ability to increase the technological development, the substitutability of the resources and the overall human adaptive capability (Page 1997). Moreover, there is no practical way to test any of the assumptions required for incorporating intergenerational equity to policy making, a fact that endangers the acceptability and success of policies applied toward this direction (Elliot 2004:146-147).

- The idea of participatory *democracy* as a way to achieve sustainability was initially referring to the problems of equity in developing countries. However, it is applicable to all kinds of societal structures. As stated in the WCED report, "sustainable development requires a political system that secures effective citizen participation in decision making…" (Carter 2001:205). It is a goal, for the policy makers that seek to apply sustainability governance, to escape from the traditional top-down approaches of administration and include members of all levels of the society in their decision making procedures. It is essential that a participatory and deliberative democracy will be recognised by the communities as a distinctive means of organizing and promoting policies and incentives for sustainable development (O' Riordan 2004). Application of democratic procedures in design and implementation of strategies is a precondition for their success, a fact that can be anticipated when comparing the levels of democracy between societies and the respective levels of development. According to Amartya Sen, cited by Wise (2001:57), "freedoms are not only the primary ends of development, they are also among its principal means".
- Finally a significant concept that is being addressed in Agenda 21 as a means to reach sustainability is the *precautionary principle* which is currently being applied in various sectors of the environmental protection strategy. According to it, in the areas that there is lack of full scientific certainty, cost-effective measures should not be postponed in order to prevent environmental degradation (Carter 2001:207). This principle has been the baseline of the contemporary environmental policy making; however its exact content is still a large topic of debate (Elliot 2004:145). Indeed, the definition mentions that the states should apply the principle "according to their capabilities" and therefore the issue of which countries are capable of applying what kind of measures is left open. For instance, in recent debates, the EU insists on applying a hard-law status to the principle, while the US and Australia prefer a form of complementary "approach" rather than a binding principle (Ibid).

5.5 The principles of Sustainability within Wind Power and Public Perceptions

5.5.1 Sustainability and Energy

The basic principles of the idea of sustainable development and their varying interpretations can be identified within the issue of wind power development. It should be anticipated that the development of wind power and its promotion by the governmental and regional authorities of the EU countries are directly related to sustainability.

In reference to global warming, the reduction of CO_2 emissions from energy production has been characterised as one of the main methods of confronting the problem. The UNDP (2000) provides an explicit definition of sustainable energy, incorporating environmental, social and economic aspects. On the one hand, the energy services should be a source of prosperity, by

increasing the social welfare and, on the other hand, in sustainable energy production, the quality of life of generations should not be endangered and the ecosystems should not be permanently disturbed (UNDP 2000:31). Furthermore, particular attention should be drawn to the security and availability of energy resources as well as to the social background of an energy operational area; *a prerequisite for the development of sustainable energy is that this will occur in a socially acceptable manner* (Ibid).

In accordance with these provisions, scenarios that provide projections of future energy perspectives have been constructed by a number of researchers (UNDP 2000:334). Regardless of the details included in the models' variables and the variety of the results of these projections, the parts that illustrate the characteristics of a sustainable energy future have a common conclusion. *The current trends of policies and development need to change*. Similarly, *environmental protection is a common finding of these scenarios and the need for clean and efficient energy is evident* (Schrattenholzer et al 2004:160-167; UNDP 2000:364-365). Under that logic, *RES and, particularly, wind power are considered as environmentally sustainable energy solutions* by the majority of the scientific community (Carter 2001: 303-305; Ackerman 2001:195-198; Elliot 1997:35-46). Moreover, compared to the rest of the RES, the costs of wind power production, especially onshore when the external costs are accounted for, are competitive with the costs of electricity production from conventional power plants (Redlinger et al 2002:73-122; Gipe 1995:226-244, 434-436). That fact indicates an element of economic sustainability in the case of wind power development.

5.5.2 Wind Power Development: Application of Precautionary Principle and Equity

The Kyoto protocol and its ratification by the countries of the EU is an indication of various principles of sustainable development such as intergenerational equity, planning and the precautionary principle. The Kyoto Protocol emerged as a result of the worldwide concern for global warming and the impact of excessive CO_2 emissions from energy production on the phenomenon. However, the scientific explanation for the exact impact of human activities on the greenhouse effect is still in progress and currently it can only assume the negative impact of fossil fuel burning with a large percentage of certainty, yet not one hundred percent (Elliot 2004:84-89;Carter 2001:249). *Therefore, the Kyoto protocol with the consequent provision of a shift to RES, is the result of the application of the precautionary principle by the ratifying countries.*

Additionally, it can be argued that the Kyoto protocol encompasses principles of both intergenerational and intragenerational equity. In the first case, the worldwide environmental concern and the target of providing the future generations with a viable planet, implicitly illustrates the application of intergenerational equity. For the second case, when analysing its provisions, the UNFCCC stresses that developed countries should lead the effort of confronting climate change, recognising in that way their historical responsibility for the creation of the phenomenon (Elliot 2004:85; Carter 2001:249). Despite the variety of arguments on whether the Kyoto protocol actually applies intragenerational equity and the consequent conflicts of countries' interests, it should be, in any case, considered as an attempt at applying social sustainability(Carter 2001:249-251). A*s a result, the wind power development, as a result of the Kyoto Protocol and its subsequent CO_2 emission obligations, can be considered an application of equity.*

Following similar logic, within the promotion and implementation of wind power projects by the EU countries, mainly as a result of the Kyoto Protocol obligations, we can identify elements of two more principles of sustainability, *planning and policy integration*. Indeed, the UNFCCC convention and the subsequent Kyoto Protocol can be interpreted as international efforts to plan their development following principles of sustainability, especially on the environmental level.

Since the emergence of the concept of sustainable development, planning in this direction has been substantial on a national as well as supranational level; the EU Environmental Action Plans, the National Green Plans as well as the Local Agenda 21 applied in many EU countries are some *examples of sustainable planning* (Ibid 271-278). Therefore, a shift to RES and wind power under financial incentives or obligations set by local or centralized governments can be considered as part of greater environmentally sustainable planning. Additionally, *the effort for wind power implementation is the result of policy integration* of various sectors both through a reform of the organizational regime of governments as well as through the introduction of new techniques of administration. In order to achieve a strategy of mitigating climate change, the sectors of transport, energy, and the economy, need to have a coherent strategy, and the Kyoto protocol attempts to effectively merge the demands of each sector (Ibid 258). Finally, administrative tools such as Environmental Impact Assessment, Risk Analysis and Cost-Benefit analysis have been applied in order to support any decisions regarding environmental policies with scientific and technical data. Regardless of the individual success of the use of these tools, they have been proven significant and are considered as a prerequisite for the planning procedures and the development of wind power (Redlinger et al 2002:169-212; Carter 2001:263-270).

5.5.3 Implementation of Wind Power Schemes: The conflict of benign concepts

Despite the aforementioned anticipation of wind power and its development as a sustainable solution, considering many aspects of the concept, the implementation of wind power projects on the local level, as described above, has not been as promising. This situation reveals a *conflict* within the paradigm of sustainable development.

It is arguable that the creation of the international regime towards sustainable energy production through RES and wind power has been successful and it is widely accepted by the public. However, the implementation of the regime's provisions on the local level has been complicated and has resulted in a slower than expected development of this renewable source. In one aspect, this phenomenon could be easily justified by considering the common implementation difficulties of most environmental regimes. Indeed, various factors such as weak international agreements, overambitious targets, inability to control local actors, lack of economic resources and weak administrative power constitute environmental regimes' difficulty in implementing in the first place (Carter 2001:244-249). However, as it was mentioned in the background chapter, for the case of wind power, apart from all classic implementation problems, the one of social opposition is critical (Elliot 1997:148). There are cases where organised social opposition has managed to delay or even postpone a wind power project; one single opponent has the right to plea against certain developments and the concern of the politicians for such protests is substantial (Krohn et al 1999; Elliot 1997:149). *Wind power development may be a sound sustainable solution regarding the global environment, equity and policy planning, yet when it comes to local implementation the parameters that define such terms are different and they are set by the local communities* (Redlinger et al 2002:163-164; Elliot 1997:148-151). As Jamison & Hard (2005:291) note, "environmental concern means very different things to different people" and in our case it is possible that the local inhabitants of a potential area for a wind park are concerned more about the aesthetic integrity and the biodiversity of their nearby land than the potential global benefits of a shift from conventional electricity production to wind power. Therefore, "thinking globally and acting locally, as the slogan goes, may not always be as easy as expected" (Elliot 1997:166). It is not the purpose of this study to judge whether the different concerns of citizens of different areas are justified or not, particularly when clearly subjective issues such as aesthetic values are involved. However, it is significant to illustrate and critically consider the emerging conflict within the

concept of environmental sustainability at the local and global level; it implies 'a split within green consciousness' (Szarka 2004).

A second conflict related to wind power implementation is located between social and environmental sustainability. The global environmental benefits of wind power are often prioritised over their consequent social impacts (Toke & Strachan 2006). Additionally, it is questionable whether democratic and participatory procedures are always followed by the developers prior to the construction of a wind park (Elliot 1997:173-176). The relation between democracy and environmental sustainability has been addressed in the literature and it is not yet clear whether liberal democracy is an adequate means to solve environmental problems within a society, or whether a type of 'eco-dictatorship' is required (Toke & Strachan 2006;Feichtinger & Pregerning 2005). *Considering that democracy is one of the main principles of sustainable development, it is obvious that a possible public opposition for a wind park illustrates a conflict within the whole concept of sustainability itself* (Carter 2001:281). The major benefit of wind power, which is the application of environmental sustainability, comes into conflict with the democratic rights of citizens and consequently with social sustainability. What is necessary to be considered, is that the expression of any, justified or not, objection to a wind power project is a democratic right of a citizen. The opposition cannot be disregarded as faulty, mistaken or as just a result of effective anti-wind lobbying; although there are circumstances where this is the case, there is certainly a portion of the opponents that express substantiated arguments against wind power development (Elliot 1997:164). On the other hand, the environmentally-oriented pro-wind claims always remain

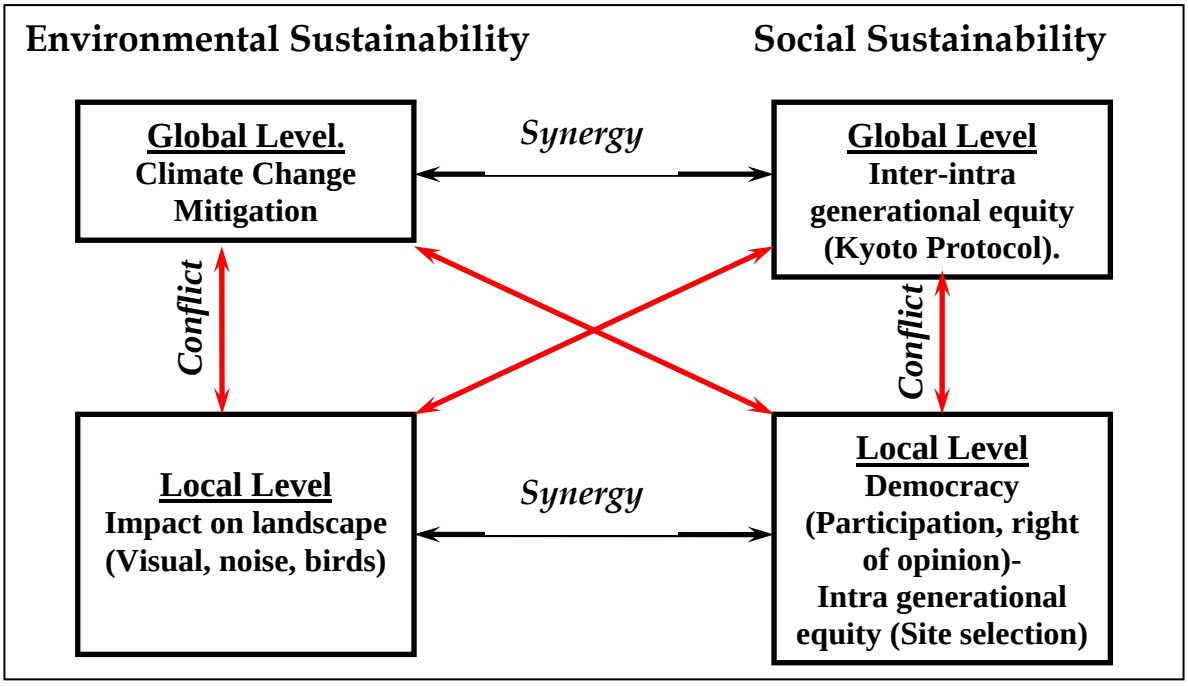

Figure 2 : The conflict between the "pillars" of sustainability

justified. The described state is illustrated in Figure 2 where four conflicting and two synergistic relationships are anticipated between and within the environmental and social pillars of sustainability.

It is therefore important, relating to the research on public perceptions towards wind power, to investigate whether these factors have been addressed by the researchers. They are considered as aspects that, if addressed, would enhance the understanding of the decision-makers regarding the nature of wind power implementation difficulties.

6. Methodology

The analysis of the research on public attitudes toward wind power will be carried out using various literature resources on the subject within the context of the EU. Case studies conducted in specific areas, surveys, as well as analytical articles will be the main objects of the research evaluation. The studies included as the base of the literature review are not in all cases studies specifically on public perceptions to wind power. There are studies included that refer to general implementation methods or problems of wind power projects and parts of them are analysing the issue of public perceptions. The material has been abundant in areas where the interest and the current installed capacity of wind projects have been significantly high, such as Germany, Denmark, Sweden, the UK, the Netherlands and Spain. On the other hand, the research conducted on public attitudes for other EU countries with considerable wind potential and installed capacity, such as France, Portugal, Austria and Greece has been difficult to obtain, either due to its general scarcity or due to the lack of a version in English language. Moreover, the findings of comparative studies of two or more countries will be considered for the analysis as well as surveys which have a holistic cross-country perspective on the issue.

The analytical part of the thesis can be classified as a *qualitative content analysis* although it can be argued that a paper that examines a large number of varying studies has an implicit quantitative nature. According to principles of a content analysis, the researcher is coding certain themes and subjects followed in the reviewed literature focusing not only in what is obvious in the content but also to any underlying meanings (Bryman&Teevan 2005:334). Therefore in the case of the research on public perceptions regarding wind power projects, *different patterns and themes of the reviewed literature are being identified and analysed regarding their content*. Moreover a content analysis research often examines the occurrence of different words within the reviewed literature or in other cases the disposition of a particular author toward a specific issue (Ibid). In our case, words like 'sustainability' or 'equity' are examined, not only regarding the frequency of their appearance but also as words that facilitate a broader meaning for the respective study. Additionally the motivation and the underlying preferences of the corresponding author are being discussed considering the addressed ideological concerns identified in a study. In a qualitative content analysis it is common for the process of extracting the themes or patterns to be considered implicit (Ibid p.337). However in our case, *the selected themes occurred through an initial assessment of the reviewed literature and selection of prevailing patterns as well as through topics that were judged to be of relevance to the issue by using scientific argumentation*. Moreover, the analytical part of the thesis contains elements of discourse analysis on the sense that in some cases it focuses on details of the discourse of the studies, such as differences in definitions of terms or differences in ways of addressing similar views (Ibid).

In order to effectively assess the reviewed literature and consequently reach to useful conclusions and proposals it is considered essential to structure the analysis dividing it into three parts.

1. In the first part, the *basic methodological and technical characteristics* of the examined studies are identified and four local background parameters, namely awareness, culture, wind potential and local policies which are considered as important for case specific studies, are being tested in regards of the ways that they are being addressed in the literature.
2. In the second part, *the main common themes and patterns occurring in the existing literature* are being analysed, attempting to cover a wide range of addressed issues regarding public perceptions on wind power. Three categories or research topics have been selected in order to focus the analysis into specific areas that are commonly met in the literature; the environmental

organisations and media, the local participation and the NIMBY phenomenon in regards with the ways that these themes are being addressed in the reviewed literature.

3. The third part will include *the identification of the 'pillars'* and some of the basic principles of sustainability within the literature and whether these have been addressed in a direct manner. Particular attention will be given to the method, underlying or not, the conflict within the paradigm of sustainability is being referred at in the examined studies.

Consequently, the findings as well as the different possibilities of how the paradigm of sustainability can be incorporated in future researches will be discussed.

7. Analysis

7.1 The profile of the literature

The analytical part of this study is based on the analysis of the content of more than 35 studies. These are divided into studies in which public perceptions toward wind power projects is the main topic of research and studies that research wind implementation issues, with public perceptions included in their analysis. Regarding the type of reviewed literature this can be distinguished as:

1. Surveys or summaries analysing the results of opinion polls (e.g. BWEA 2005; Braunholtz 2003).
2. Studies providing with an overview of the conducted research in public attitudes (e.g. McGowan & Sauter 2005; Devine –Wright 2005).
3. Articles on scientific journals based on previously conducted research by the authors or proposing research methods (e.g. Gamboa & Munda 2007; Toke 2005).
4. Extensive dissertation theses on issues of wind power implementation (e.g. Khan 2004; Devlin 2002).

The amount of information used for the analytical part differs between the reviewed articles. There are a number of studies whose elements of methods and discussion have been used in various parts of the following analysis. These have influenced to some extent the selection of the main issues discussed in the analytical part. Other studies' characteristics have been used to a lesser extent in the analytical part; however they have assisted the process of identifying patterns and established viewpoints in the literature of public perceptions. In any case, all of the reviewed literature was employed, although in varying manners, in order to provide an overall picture of the research on public perceptions and support its evaluation.

7.1.1 Types of surveys

The examined literature has been categorised according its methodology. It is essential, prior to the use of an article's characteristics, in order to substantiate the thesis' argument, to identify the *type of method* used in this article. The reviewed studies will be, at this stage, classified as qualitative, quantitative or a mix of both styles, while particular attention is being paid to the studies that apply special methods, such as multi-criteria evaluation techniques or conjoint analyses. During the process of reviewing the studies, particular attention was paid to *the disposition* of the researchers. Strachan& Lal(2004) in their review on social and environmental impacts of wind

power developments, stress the fact that there is a lack of objectivity observed in the literature, mainly in favour of the pro-wind argumentation. This fact was examined for each study in order to assess the weight of the respective arguments without dismissing the study as a whole. For instance, the study conducted by a wind energy association is expected to have a pro-wind "essence" in its argumentation, *but this fact does not imply that the methods or the results of this study are not valid.*

Table I: Overview of studies

Author/year	Studied Countries	Content	Type	Author/year	Studied Countries	Content	Type
Agterbosch (2007)	Netherlands	P.P.	Both[1]	**Khan (2004)**	Sweden	W.P.I	Qualit.
Alvares-Farizo&Hanley(2002)	Spain	P.P	Quant.[2]	**Krohn &Damborg(1999)**	Multiple	P.P.	Qualit.
Bell et al (2005)	Non Specific	W.P.I.	Qualit.	**Loring (2007)**	Multiple	W.P.I.	Both
Braunholtz (2003)	Scotland	P.P.	Quant.	**McGowan &Sauter (2005)**	U.K.	P.P.	Quant.[7]
BWEA (2005)	U.K.	P.P.	Quant.	**Michaelowa (2005)**	Germany	W.P.I.	Qualit.
Carlman (1988)	Multiple	W.P.I.	Qualit.	**MORI (2004)**	England	P.P	Quant.
Cavallaro & Ciraolo (2005)	Italy	W.P.I.	Both[3]	**Nadai (2007)**	France	W.P.I.	Qualit.
Christensen &Lund (1998)	Denmark	W.P.I	Qualit.	**Söderholm et al(2007)**	Sweden	W.P.I.	Qualit.
Devine-Wright (2005)	Multiple	P.P	Qualit.	**Strachan &Lal (2004)**	U.K.	W.P.I.	Qualit.
Devlin (2005)	Sweden	P.P.	Qualit.[4]	**Toke D. (2005)**	Multiple	W.P.I.	Both[8]
Ek (2002)	Sweden	P.P	Quant.[5]	**Toke et al (2007)**	Multiple	W.P.I.	Both
Ek (2005)	Sweden	P.P.	Quant.	**Urban (2004)**	Netherlands	W.P.I.	Both
Gamboa& Munda (2007)	Spain	W.P.I.	Both[3]	**Van der Horst (2007)**	Non Specific	P.P.	Qualit.
Hagget &Toke (2006)	England	P.P.	Both[6]	**Warren et al (2005)**	Multiple	P.P.	Both
Houlihan (2002)	Ireland	W.P.I	Qualit.[4]	**Wolsink (2000)**	Netherlands	P.P.	Both
Jobert et al (2007)	Multiple	W.P.I.	Qualit.	**Wolsink (2007a)**	Multiple	W.P.I.	Both
Kaldellis (2005)	Greece	P.P	Quant.	**Wolsink (2007b)**	Multiple	W.P.I.	Both
Khan (2003)	Sweden	W.P.I.	Qualit.				

Notes: P.P. means Study on Public Perceptions, W.P.I. means Study on Wind Power Implementation. The studies in blue are extensive dissertation theses. 1. Use of Group Support System (GSS) 2. Use of Conjoint Analysis. 3. Use of Multicriteria method. 4. Use of Systems Analysis. 5. Use of Choice Experiment Approach. 6. Multi-Method Analysis 7. Review of Surveys 8.Use of Regression Analysis

7.2 Background parameters of the studies

7.2.1 The parameters of Culture and Awareness

***Research questions**: In what ways the specific cultural characteristics of a country or an area are accounted for in the research on public perceptions? What is the role of the level of awareness of a society about wind power issues? Is it included as an aspect that affects public perceptions?*

It has been demonstrated in the literature that the cultural characteristics of a country or an area are possible determinants of the attitudes of the public toward wind power. With the term

culture we refer to the specific patterns that the members of a society have regarding their values, beliefs and attitudes. It is believed that the culture of an area's citizens affects the outcome of the implementation of wind power schemes. For instance, regarding the opposition to wind power as observed in some parts of the UK, Short (2002:55) refers to the eternal preoccupation of English citizens with ordered and tidy landscapes, showing that it might be a matter of the culture in question that the acceptance of wind turbines is relatively low. Considering the fact that culture is an intrinsic and rarely transformable aspect of an area's society, it is essential to investigate whether it is included in a preliminary way in the studies of public perception toward wind power, especially in the case-specific ones. There are studies that account for that factor. For instance, a survey conducted by MORI (2004) regarding the citizens' awareness on wind power issues as well as their opinion on the aesthetic impact of the wind turbines in Devon, tests the variance of opinions between rural and urban oriented inhabitants.

On the other hand, the variable of wind power awareness is largely dependent on the significance that it is given to it by the corresponding political authorities. Regarding the attitudes toward wind power it has been repeated in the literature that an efficient educational program about the benefits of wind power to the environment would increase the public acceptance of wind power in an area (Hoppe-Kilpper& Steinhauser 2002:93-94; Righter 2002:30). However, this argument is being contested in the reviewed literature due to the fact that the public acceptance of wind power in the EU is relatively high and therefore it is not accurate to claim that the societies have a lack of wind power knowledge. In any case, it is interesting to examine in which ways the level of awareness of the inhabitants of an area is considered in the reviewed literature.

7.2.1.1 The factor of Culture

The aspect of the culture of a specific area is not explicitly accounted for in the majority of the reviewed literature. In some sense, this outcome was expected due to the fact that the cultural characteristics of an area are fairly complicated. This would possibly require a large amount of additional research in order to be adequately included in a study. Therefore, although it is not stated by the researchers, the cultural characteristics of an area appear to have been considered non-significant in a study's assumptions. Nevertheless, there are a few exceptions within the reviewed literature. For instance, the Danish success story on wind power implementation has been, in many cases, partly attributed to the culture of the country; while, after many years of development and tradition, the wind turbines themselves are being considered by some authors as parts of the Danish culture (Loring 2007; Nielsen 2002:130; Carlman 1988). Toke et al(2007) in their comparative study of the wind development in six countries, note that different cultures perceive technology, environmental issues and planning processes in different ways and, based on this parameter, they perform their analysis. Finally, Kaldellis (2005) in his study comparing public attitudes between different regions in Greece addresses the cultural factor in the analysis of the results. There was a significantly larger acceptance of wind power projects on the islands rather than on the mainland and the author attributes this disparity to a cultural difference, with the citizens of the islands being referred to as more 'open-minded' due to their frequent interaction with tourists (Kaldellis 2005). *However, the above examples are exceptions to the rule.*

7.2.1.2 The factor of wind power awareness

The level of awareness of the citizens, as a factor that influences public acceptance of wind power projects, has been advocated by a number of authors; however, the bulk of the research on public perceptions tends to overlook these arguments. This fact is illustrated in the reviewed

literature, where a small minority of the studies addresses the parameter of knowledge as a possible determining factor of the attitude of a citizen toward a specific wind power project. For instance, Devlin (2002), in her systemic analysis of the implementation process of wind power in Sweden, includes the variable of education related to wind power in her causal loop diagram, where it demonstrates that education is directly related to the willingness of citizens to accept the introduction of turbines. In a more theoretical manner, Bell et al (2005) address the issue of education of the public on wind power. According to the authors, in order to mitigate the arguments of the opponents to wind power projects, there is a need to provide them with technical details and education regarding the project. However, they stress the fact that this kind of education should be provided through a participatory process (Bell et al 2005). Therefore, education as an informative process is considered important in increasing the public support of wind power. The fact that it is being placed in the context of participation in the planning process highlights the comparative importance of the local participation factor in the research on public perceptions.

7.2.2 The importance of wind project efficiency

***Research Questions**: Are the wind potential variances of different areas considered in the research on public perceptions? Do the researchers account for the efficiency of a project as a background factor?*

The wind potential of an area, being a geographical parameter, does not influence the public perceptions of the citizens toward a wind power plant; however, it is considered an essential aspect of the research on these perceptions. The reason for that argument is that, in many studies on public perceptions, there is often a discussion regarding alternative proposals for the construction of a project. The validity of these proposals must be established according to their efficiency. As it will be shown further on, this parameter is rarely accounted for and, in the cases that it is, it is not done in an explicit manner.

7.2.2.1 The wind potential of an area and the factor of efficiency: Background

One of the most important factors for the realization of a wind park project by a developer is the estimated wind resource or, in other words, the wind potential of a particular area. Considering the fact that the annual electricity production of a wind turbine is proportional to the cube of the site's annual mean wind speed, it is obvious that areas with high wind speeds are required for an optimal electricity production from a wind turbine (Boyle 2004:267). Therefore, the above exponential relationship between wind speed and power output indicates the significance of the wind speed factor when selecting an area for a wind power project (Redlinger et al 2002:10; Gipe 1995:150-151). Choosing a high-wind location for the creation of a wind park would result in a significant increase in wind power output and consequently in a substantial decrease of costs for generated electricity (Redlinger et al 2002:12-22). As a result, it is essential to achieve a wind power plant's operational efficiency in order to result in economically viable projects.

7.2.2.2 Efficiency-Studies included

The parameter of wind resource, dependent on the geographical distinctiveness of an area, is not commonly addressed in the research on public perceptions towards wind power projects.

The studies of interest in this case, are either the ones that are conducted in order to assist the planning process of a specific wind project or the ones that theoretically examine and attempt to define the role of public perceptions in the implementation process of wind power.

7.2.2.3 Studies that simply refer to the efficiency parameter: A few examples

It was found that there are few cases that address the geographical and wind resource parameters in various ways. Regarding the studies that address the parameter of wind resources as one that has a key role in wind power planning, there are *a few main examples* in the reviewed literature that follow this pattern. However, they do it in a rather descriptive manner. Jobert et al (2007), in a study of factors that lead to a successful local acceptance of wind energy for cases in Germany and France mention the adequate wind potential of an area as an 'obvious precondition' for successful wind power development along with the analysed social factors (Jobert et al 2007). Similarly, Khan (2003) in his study of wind power planning in three Swedish municipalities clearly states the importance of planning a wind power project in windy locations as an issue of economy and efficiency. The researcher argues that this parameter adds complexity to the planning process, considering the fact that windy locations and open areas are usually areas of high landscape value (Khan 2003). However, when comparing the effectiveness of the planning processes of the three municipalities he mentions that they all have similar wind potentials (Ibid). In that way, he excludes this parameter as a factor that affects the planning procedures in the specific case. It can be argued that such an exclusion of the parameter is one of the inevitable assumptions that needs to be made during a study. On the other hand, it is questionable whether such generalizations are feasible when involving critical parameters such as the wind speed of a location.

7.2.2.4 Studies where efficiency is considered: Wind potential as a boundary factor

Amongst the assessed studies of the literature there are cases in which the wind potential of an area is notably considered and influences, to a great extent, the consequent method of research. A characteristic example of this type of research is the multicriteria approach used by Cavallaro & Ciraolo (2005) in order to evaluate the possibility of wind power on an Italian island. Regarding the issue of wind potential of an area, the researchers first assessed the wind resources of the island and consequently constructed four theoretical alternatives of efficient wind parks based on the results of their initial assessment (Cavallaro & Ciraolo 2005). In that way, the analysis of the study can be conducted in a more realistic way and, furthermore, account for any additional parameter of wind power planning, namely environmental, economical and social factors. A similar approach toward the wind potential parameter was followed by Ek (2002) in a study on the environmental impacts of wind power in Sweden. Following the choice experiment method, Ek addresses the fact that wind potential is considered high in mountainous and offshore areas in relation to common onshore locations and therefore offers three options to the participants of the survey (Ek 2002).

Despite the initial consideration of the wind potential of an area in the first place, the argumentation that follows during the discussion of the survey's results shows that *this particular distinction can be misleading.* The suggestion of the three specific alternatives indicates that it is being recognised that the wind speed of an area is important for efficient wind park development. However, in the conclusion of the study, the focus is primarily set on the public's preference as indicated from the survey's results. The option of constructing wind power parks in offshore areas prevails, cancelling, in a way, a big part of possible future development of efficient wind parks on land (Ibid). Therefore, although the distinction between different options of good wind potential is following a logic that accounts for the efficiency of a wind park, *the available options are, to a*

large extent, broad and there is a possible exclusion of onshore or mountainous areas, where a wind park could be both efficient and accepted by the public.

Finally, there is a part of the reviewed literature that addresses the issue of the wind potential of an area as a factor that the developers have examined. The researchers offer multiple options to the participants of the corresponding surveys on public attitudes towards wind power. Gamboa & Munda(2007), in a study regarding the problem of wind farm location, apply a multicriteria evaluation method in order to integrate socio-economic and technical factors that affect the implementation process. The investors claim that they have considered the concerns of social actors for their potential wind park locations in Spain. Based on the developers' proposals, the authors examine a set of seven alternatives, with technological efficiency and visual impact criteria being the main determinants of the choices (Ibid). In that case, it is a matter of *confidence in the claims of the developers* in order to determine whether the multicriteria study is conducted in a realistic way. It is interesting to notice that one of the alternatives presented is the business as usual scenario or, in other words, the *cancellation of the project*. This fact shows that there is also this possibility when the technological and socio-economic requirements for the successful implementation of a project do not coincide.

According to similar logic, Wolsink (2007a) offered 19 different potential sites of the Wadden Sea region in the Netherlands for evaluation from the members of the Wadden Vereniging, a highly influential organisation concerning this particular area (Wolsink 2007a). The reason for this wide array of options is that the whole area has been characterised as an area of economically efficient wind potential (Ibid). It is questionable, however, if all of these alternatives have no differences regarding their wind potential. *Therefore, the outcome of the research would require further examination for the highly acceptable sites.*

7.2.3 The role of the central politics

***Research questions**: In what ways are the politics of individual countries regarding wind power planning being perceived in the research on public perceptions? Is it examined as a parameter that affects the attitudes of citizens and the implementation of wind power?*

The politics of the EU countries concerning wind power have been influenced to a great extent by the general discussion on climate change. However, there are differences in the planning policies for wind power projects in most countries and they have affected the outcome of the implementation process in many cases. The term "planning policies" is not used in reference to the general economic support schemes (feed-in, green certificates) that are being introduced by the governments in order to promote wind power. Planning policies are concerned with *the specific procedures administered by the government concerning the siting of an area; promotion of economical incentives and institutional framework programmes for wind power implementation.* It is essential for the credibility of a research study on public attitudes in a particular country to examine in what ways this parameter has been considered. Moreover, such country-specific parameters are required in order for the reader to obtain a holistic view regarding the nature of public perceptions of citizens throughout the EU. Finally, it is important to examine whether studies that compare the public perceptions of citizens among different countries consider the respective planning policies.

7.2.3.1 A general view on policies by the research: Success stories and institutional problems

A typical example of where the influence of the policies on the attitudes of the public and the implementation process of wind power is being highlighted by the research is the planning system

in Denmark. Krohn & Damborg (1999), in their analysis of the successful wind power implementation story of the area Sydthy, in Denmark, stress the fact that most citizens of this area are members of wind co-operatives; a group of people sharing the ownership of the wind park. This type of ownership has been encouraged and promoted by the Danish government since the late 80s (Christensen & Lund 1998). *Therefore, the above example was a case wherein the political parameter was adequately addressed in a country-specific study.*

In the case of the Netherlands, the impact of a national planning policy has been extensively referred to in the literature regarding public perceptions, following the argument that the rate of wind power development has not been as high as predicted for this country. Agterbosch et al (2007) make a comparison between the entrepreneur's and civil society's views toward institutional and social conditions for wind power implementation. They define institutional conditions as the formalized policies on all governmental levels imposed on all stakeholders. Prior to that they have analysed the political framework of the Netherlands on wind power and, therefore, *their research can be considered well facilitated in that aspect*. Wolsink (2000) stresses the difference in institutional settings between the Netherlands and Germany where, in the Netherlands, the utilities have maintained a pivotal role regarding the investments on wind power. Consequently, the observed wind park siting fallacies are being attributed to this inefficiency of institutional capacity (Wolsink 2000).

7.2.3.2 Cases where policy factors influence the research on wind power implementation

Similar cases where the planning policies factor is being considered in the research on public attitudes can be observed in studies of various countries, such as in France (Nadai 2007) and the UK (Hagget & Toke 2006;Warren et al 2005). In the case of Sweden, Khan (2003) criticises the governmental policy as ambiguous for the reason that it generally supports wind power but avoids taking measures that would support wind power on the implementation level. As a consequence the municipalities are the key actors in developing wind power. This fact has implications for public participation and, consequently, for public perceptions (Khan 2003; Devlin 2002). In a more general context, Ek (2002), applying the choice experiment method for evaluating public preferences toward wind power rules out the alternative of no wind project development for the reason that the political goal in Sweden is to increase wind power capacity. Finally, a number of studies that compare public perceptions and implementation processes of wind power in various countries account for the differences in the respective institutional and political backgrounds(Loring 2007; McGowan& Sauter 2005; Devine-Wright 2005) . In that way, they provide the policy makers and future researchers with well-substantiated and categorised studies, in terms of defining and analysing each country's particularities prior to the comparison of their citizens' attitudes.

A fine example of that category is the study of Toke et al (2007), regarding the comparison of wind power implementation outcomes in six different countries. The factor of political planning and systems is placed among the important parameters that influence the development of wind power in a country. Most significantly, it is being analysed in advance of the discussion on public participation and local protection groups. An analysis of the similarities and differences of the six countries' planning programmes is conducted and it is concluded that different institutions and policies shape, in a sense, the settings of local attitudes and interests in different countries (Toke et al 2007).

It is concluded that the political and institutional background of a country, regarding wind power planning, is a factor that, in general, is included in the reviewed studies, especially in the case-specific ones.

7.3 The main observed patterns in the research on public perceptions

7.3.1 The opposition to wind power - local environmental organizations and media

Research questions: *What is the perception of the researchers toward the opponents of wind power projects and their means of expressing their objection? Do the researchers form a supportive, argumentative, dismissive or a mixture of stances toward the views of local anti-wind campaigners, environmental groups and media?*

It was demonstrated that the increasing amount of research on public perceptions emerged as a result of wind power implementation problems in various countries and communities. Strong social opposition is one of the reasons that create these problems. The means by which this opposition is commonly expressed are the media, grassroots organisations and local campaigners. Planners and developers tend to be influenced to a greater extent by the media and other such organisations rather than by citizens that do not voice their opinions through a public forum. However, the theoretical aim of the research on public perceptions is to investigate the attitudes of *all the affected citizens* towards a wind power project. For the reason that, regardless if they are right or wrong, these groups do not express the opinion of the whole affected population, the research on public perceptions should not necessarily be based on their arguments. On the contrary, it should analyse the implementation problems of wind power in a holistic manner, by applying scientific, empirical and statistical methods. Therefore, it is essential to investigate to what extent the views of the media and local grassroots organisations are being adopted or criticised in the research on public perceptions. In that way, a comparison between the "*communicated*" and "*researched*" public opposition will be possible to formulate and the respective research on wind power implementation will positively influence future decisions.

7.3.1.1 Dismissive and descriptive references to environmental groups

Examining the patterns that are followed in the reviewed literature we can locate different perspectives on how the opposition, as expressed by the environmental groups and media, is being accounted for.

Some authors or researchers are being dismissive toward media and environmental groups. BWEA (2005), in reference to environmental groups, claims that the minority too often leads the discussion on wind power projects. Opinions such as '…the pressure…has been marshalled by a few vocal anti-wind farm groups…' (Boyle 2004:275), or '(the negative view)…is manipulated by…media and lobby groups' (Short 2002:53) appear often in the literature on wind power.

However, it is arguable whether these comments are assisting the validity of research on public perceptions. Even if the authors are, in many cases and in the long term, proven to be correct in their arguments, the sarcastic language, the context in which the comment is placed and its inefficient substantiation represent a lack of objectivity on the issue. Therefore, an entire study can be subjected to criticism as to whether it is biased or not. There are studies that approach their views in a summarising way or in order to set up the background of the problem, without ever relying on their arguments to conduct their research. Söderholm et al (2007) refer to a number of newspaper titles against wind power and comment that they illustrate the prevailing local opposition in Sweden; however in their analysis they explicitly examine further parameters of public attitudes.

7.3.1.2 Analytical views on environmental groups' arguments

Depending on the purpose and context of each study, we can identify different approaches toward the arguments of the media. There are researchers that, while concluding their analysis, are rather critical toward the "communicative" arguments of the opponents. For instance, Warren et al (2005), conclude that there is increased public support for local wind farms in Scotland and Ireland, which increases with the citizens' personal experience. Following this conclusion, they put it in contrast with the media coverage about fierce grassroots opposition and criticise them for seeking minority opinions instead of the "silent, contended and (less newsworthy) majority" (Warren et al 2005). *This was an example of an indirect testing of an argument; the researchers falsify the arguments of the media with the use of their results.*

On the contrary, Strachan& Lal (2004), facilitate their methodology by directly testing the arguments of the anti-wind groups and placing them in comparison with those of the pro-wind groups. In that way, the anti-wind campaigners' arguments are tested on their validity regarding the planning process, visual concerns, noise and other parameters with the use of empirical data acquired from the corresponding literature on wind power issues (Strachan& Lal 2004). In a similar way, *the views expressed by the media or environmental groups have determined the methodology of studies on public perceptions*. Loring (2007), in her study regarding wind planning in England, Wales and Denmark, notes that the media coverage and the opinions of interest groups are two out of six indicators that determine the public acceptance of a wind project. Therefore, in that case, the media and environmental groups' views are used as data of a qualitative study rather than mere initiators of a discussion.

In some articles, the opinions expressed by environmental groups and media are being used as case studies that verify the authors' argumentation on public perceptions.

Wolsink (2000) addresses the role of the press by classifying the argumentation and the number of articles regarding the opposition toward wind power at specific sites. Consequently, he uses the extracted data in order to substantiate his theory regarding the NIMBY phenomenon. Additionally, he analytically uses the case of the environmental group, Wadden Vereniging, and its opposing views toward the development of a wind project in the Wadden Sea area. The demonstration of conflicting views regarding the issue within the members of the organisation itself, where their opinions were not officially expressed, assisted the researcher in concluding that there was a general deficit in institutional arrangements (Wolsink 2000).

Finally, important for our discussion is the approach of Haggett & Toke (2006) toward the views of anti-wind campaigners.

The ways that the environmental groups express their arguments is the basic point of argumentation on the discourse analysis' part of the researchers' multi-method study. Haggett & Toke analyse in what ways the campaigners promote their opposition. They study the language and the methods of promoting the respective arguments to the public, regarding their landscape views and NIMBY accusations. At the same time, it's being stressed that the purpose of the discourse analysis is to illustrate the different accounts that appear in conflict with each other, and therefore the nature of this conflict, rather than show whether these views are valid or not (Haggett & Toke 2006). In that case, we can observe how the parameter of the environmental groups' opinion, or the "*communicated*" opposition, is being integrated in a broader study on public perceptions: As the theoretical part of a multi-method study, supplementing the results analysed in the respective statistical part.

7.3.2 The argument of local participation in the research

***Research questions**: In what ways does the research on public attitudes account for the issue of local participation in the process of wind power projects planning? How important is it considered to be by the researchers and what suggestions do they make? What is the role of economic incentives offered to the citizens and how are they included in the research?*

The participation of citizens in the planning process of a wind power project can be characterized as a factor that influences to a great extent the attitudes of the public towards wind power schemes. This can be anticipated when examining the amount of research on public perceptions that consider this issue as significant. Some arguments that support that statement are that local participation in the planning process, apart from being a fundamental democratic process, enables the developers to have a better understanding of the consumers' behaviour and mitigate any possible objections and problems before they arise. Moreover, the participation of citizens in the planning process, in a direct way or in a consultation manner, offers a better insight to the developers about the common wind power issues that might emerge such as visual impact and noise (Strachan& Lal 2004; Khan 2003).

The approach of different researchers varies in the subject. For instance, some studies account for the local participation of citizens when they conduct a survey among a population sample. Others analyse the participation factor as a required solution in their conclusions. An additional view focuses on the economic incentives offered by the government, or the investors, to the land-owners in order to assist the implementation process and minimise any potential opposition to a wind power project.

7.3.2.1 Participation as consultation: Two representative studies

Among the reviewed studies, there is a significant amount that include the role of local participation as a factor of the main part of their research. In surveys that have been conducted on a sample of the population, there are cases that include questions about local participation. Regarding the simplest form of local participation on a wind power project, which is the preliminary public consultation, Warren et al (2005), in a survey conducted in South West Ireland, include questions about the manner and timeframe in which citizens were informed about the construction of wind farms in the area. In this case, it was found that the prior consultation process was problematic and 40% of the respondents were dissatisfied with it. Consequently, despite the observed growing support of wind power in this area, a relatively strong opposition to the wind parks, which in some cases reached 40% of the sample, was recorded as well (Warren et al 2005). However, although there was an obvious correlation between the factors of citizens' discontent regarding the performed public consultation and citizens' opposition to wind parks, this was not regarded as a cause-effect relation by the particular study.

In a more explicit manner, the aspect of public consultation and information is examined in a study on people's attitudes about living close to wind farms in Scotland done by MORI on behalf of the Scottish Executive (Braunholtz 2003). In the breakdown of the results of the MORI survey, a whole chapter is devoted to information and consultation; *however, it is contestable whether or not the framework and results of this chapter can assist the researcher in gaining a better understanding of public attitudes*. The participants of the survey were asked questions regarding the time they were informed about the construction of a windfarm whether they recalled any public consultation being conducted by the developer or the local authority department, whether they were satisfied with the consultation process and if they had any suggestions to make for consultation in

future projects (Ibid).Summarizing the results of this part, it was found that relatively few respondents could recall being consulted by the developer or the local planning authority in the planning phase, and that the most common source of information was the local newspaper; however, not a significant amount of them was dissatisfied with the lack of consultation (Ibid). It can be argued that there are issues concerning the accountability of this part of the MORI study for the following reasons. Concerning the structural flaws of the questions, the fact that the participants' answers depend on the "recall" factor immediately creates a possibility of skewed results. Moreover, it is not clear in any part of the survey what is meant by the term "consultancy", a fact that allows for potential misinterpretation of questions, replies and results to occur. Finally, there is no implication or conclusion in the survey's results that the consultation and information factors, as presented in this case, influence in any way the attitudes of public toward wind power developments. *Therefore, it can be argued that the use of these factors admittedly adds a sense of democratic concern on the side of the researchers and the authorities, but their applicability in this particular case still remains questionable.*

7.3.2.2 Substantial participation: Quantitative, systemic and concluding ways of reference

A variety of studies on public perceptions include the factor of public participation in the planning process, when it happens in a more substantial manner than simple consultation or information. Haggett & Toke (2006) applied existing data on public participation for the purposes of a multi-method study on understanding the opposition to wind farms in England and Wales. The study applies the statistical method of regression analysis complemented by a discourse analysis and the importance of the public opinion is addressed in the former part. The role of the public is significant in the planning process in England. Any suggestions regarding a project can be expressed to the developer through the involved parish councils or directly through opinion letters. Consequently, the developer applies to the local planning authority, which, in turn, rejects or approves the project. Using a sample of 51 planning applications for the regression analysis, the authors concluded that the opinion of local parish councils and, consequently, the broader public is determining to a great extent the approval, or lack thereof, of a wind power project by the local planning authority. Therefore, it is illustrated that the factor of public participation can be included in studies on social attitudes towards wind power, even in a statistical and quantitative manner, and it can arguably assist in better understanding. However, as noted by the researchers, "the logistical regression analysis can lead to wrong results if used badly" (Hagget & Toke 2006) and this is a statement that should be considered for our analysis. Moreover, for the purposes of the statistical method, the opinion of local parish councils is presented in a binary form, to approve or not approve a wind project. Due to that fact, the actual impact that the ability of the public to contribute and determine the planning process has on its expressed attitude towards wind power schemes is not clearly observed.

There are further examples within the reviewed literature where the aspect of public participation has been used in different ways in order to analyse the complex issue of public attitudes towards wind power. Devlin (2002), in her study regarding public acceptance of wind turbines in Sweden, includes public participation in a systemic analysis. Her aim is to study the correlations of all the factors related to the willingness of the public to accept the introduction of wind turbines. In that case, among other factors, such as citizens' views of nature, level of education and financial gains, public participation is shown to have a direct relation with the acceptability of the turbines by the public for the reason that when personal opinions are incorporated into the project, the planning process is more transparent (Devlin 2002). The systems analysis approach is a useful tool that allows the researcher to study the various aspects of a problem. However, it can also

be rather misleading when the different parameters involved are not explicitly analysed regarding their meaning. *In this case, in the analysis, or in the corresponding causal loop diagram, the type of participation, consultation or active involvement, as well as which part of the public is being implied to participate, are not clearly defined.*

In contrast to the above study, *the meaning of public participation and its influence on the citizens' attitudes is being explicitly analysed in a study conducted by Loring (2007)* regarding the factors that influence the success of wind projects in England, Wales and Denmark. An analysis of 18 case studies from the above countries was conducted with the use of various sources. The aim was to identify the correlation that the factors of 'public participation', 'stability of social networks', 'public acceptance' and 'project success in implementation' have with each other (Loring 2007). In order to achieve that, Loring constructed sets of indicators for each parameter in order to systematically and specifically characterise it regarding its relative impact on each case on a scale from "very low" to "high". In that sense, Loring does a remarkable and explicit analysis of indicators of public participation, and provides a matrix that defines the six indicators and their respective scales. Thus, there is a sum of 24 different definitions on how public participation can be described in each case. Some examples of the constructed indicators for 'public participation' are: i)whether the participants represent the whole range of affected people; ii) whether the barriers to participation have been minimized and; iii) whether community members influence decisions regarding the project (Ibid.). Correspondingly, 'high participation' for the first indicator would mean that measures were taken to include all view-points on the planning procedure. 'Very low participation' for the third indicator would mean that decisions regarding the project would be made by the developers with no consideration of public comments. In that way, the results of each indicator's analysis of each case are compared in their relationship with the respective indicators of public acceptance. The study concludes that a high level of participation during the planning process is a factor that affects, but not necessarily creates, high acceptability levels for wind power projects (Loring 2007). *Regardless of the results, the most important contribution of this study to the related field of research is that it effectively demonstrates how the variables of a case need to be explicitly set and defined.*

The importance of local participation is addressed by a number of the reviewed studies as a conclusion or recommendation to the planners of future wind power developments. Based on other authors' studies on public participation or on examples of successful implementation of wind power, the researchers reach the respective conclusions. In an article regarding the conflict between wind power and nature conservation in Denmark, the authors conclude that "…the involvement and participation of ordinary people appears to be a prerequisite for the diffusion of wind turbines…" (Christensen & Lund 1998). They base their argument on the successful story of Denmark regarding the aspect of public participation. Similarly, an influential survey summarizing various studies from different countries on public attitudes towards wind power concludes that "...information and dialogue is the road to acceptance" (Krohn & Damborg 1999). Two studies regarding wind energy planning and development, in Sweden and the UK, respectively, base their conclusions on public participation on Khan's (2003) study of three Swedish municipalities (Söderholm et al 2007; Strachan& Lal 2004). Strachan& Lal (2004) state that public participation in the planning and assessment process of a project can lead to a substantial reduction of public opposition while Söderholm et al (2007) note that participation should not be case specific and should not be considered a universal solution. Finally, in a study regarding social barriers in wind power implementation in the Netherlands, the authors record the civil society's will to be more informed and involved in the planning procedure. However, in their conclusion they question the feasibility of a public participation strategy for the reason that it's time consuming and creates insecurity for the investors (Agterbosch et al 2007).

The conclusion derived from the use of the above examples is that, apart from the last case, the factor of public participation is often being used as a "master key" solution that would mitigate possible public opposition toward wind power. However, as it was demonstrated above, the term "public participation" can be interpreted in many ways. Therefore, the motivations of the researchers to use it, in cases where recommendations to developers and planners are required, can be contested. The question is whether the "public participation" solution is being used as a swift, simple and impressive quote to conclude a study or whether the researchers actually have a particular idea regarding the term, which they nevertheless fail to define. It is concluded that as long as explicit definitions of public participations are not given in the literature, the above question will remain unanswered.

7.3.2.3 Participation by economic incentives offered

A form of public participation in planning for wind power schemes can be identified when a variety of economic incentives are being offered to the citizens by the planning authorities or the developers in order to moderate the adaptation process of the construction of wind turbines in their area. The term "economic incentives" is referring to financial gains offered to land owners affected by wind power development in the form of compensation or shareholding and not to the local co-operatives that prevail in Denmark and other countries. The latter are being considered an issue of governmental policies rather than an incentive offered by the developers; therefore they were discussed in the corresponding part of the study (Christensen & Lund 1998; Gipe 1995).

The parameter of economic incentives can be identified in the reviewed literature on public perceptions in various ways.

Gamboa & Munda (2007), in their multi-criteria study, consider for evaluation, as an economic benefit, the amount of money that the developer will pay to the land-owner per installed turbine, while Jobert et al(2007) considered "financial participation" as a determining factor in the planning success in all of the case studies examined in France and Germany. Kaldellis (2005), in his study on social attitudes towards wind projects in Greece, examined in the form of a survey question whether the potential of a wind project being financially profitable for the citizens actually affects their perception for its implementation close to their area.

The view of some researchers has been distinctive regarding the strategies of the developers when they provide economic incentives.

For instance, Toke (2005) stresses the significance of the public relations and the fund-offering tactics followed by the wind power developers in England in increasing the acceptability of a project. Bell et al (2005) acknowledge that financial gains could be initiated by the policy-makers, as a possible way to mitigate the opposition to a project. However, in the context of both studies, the danger of such incentives being considered as bribery and, consequently, alienate people from wind power projects is being addressed (Bell et al 2005; Toke 2005). This statement coincides with an earlier conclusion of Gipe (1995) that "compensation is no panacea", referring to the risks existing of it being considered bribery.

It is obvious that the greatest part of the literature on public attitudes and wind power implementation, either avoids referring to the parameter of economic incentives or it takes a rather conservative approach towards it. This fact was expected in one sense, for the fact that the studies on public perceptions are mainly based on the analysis of social, physical, symbolic or communicative factors (Devine-Wright 2005). Therefore arguments of monetary meaning such as economic incentives may be considered as shallow in relation to the deeper societal aspects that are being examined in studies of public attitudes, such as the aesthetic issues or the role of the institutional settings.

As a conclusion, it was demonstrated how the parameter of public participation is included in the research on public perceptions or for implementation of wind power schemes. Public participation has been addressed in various ways and meanings; as consultation prior the construction, as provision of information to the citizens or as actual involvement to the planning process. It is necessary to mention that there are a number of studies in the reviewed literature that approach the issue of local participation in a deeper and rather philosophical way regarding its correlation with principles of democracy. These views will be included in a latter stage of our analysis.

7.3.3 The role of NIMBY

***Research questions**: In what ways is the NIMBY phenomenon being approached in the studies concerning public perceptions? Is it being accounted for as a determining factor or are there studies being more sceptical toward its significance?*

One of the most commonly discussed concepts in the research regarding the implementation process of wind power is the appearance of NIMBY phenomena within the involved communities. In general, the term NIMBY stands for "Not In My Back Yard" and it expresses a specific attitude of a part of the population toward the siting of any development in an area. There is a variety of definitions of the phenomenon; a rather inclusive one is provided by O'Hare(1977) cited by Wolsink (2007b). According to that definition, *NIMBY occurs when a citizen is by principle in favour of a specific idea or development; however, he opposes it when it is being implemented in an area that affects his personal utility.* It has been recorded as an attitude when it comes to the siting process of various kinds of infrastructure such as coal power plants, airports, landfills or nuclear waste disposal facilities. Wind power plants have been an example of infrastructure in which NIMBY was realized in the siting process. Applying the definition of NIMBY to the case of wind power would indicate that a citizen is in favour of wind energy regarding its fundamental attributes but he opposes the construction of wind turbines or parks when he feels that they negatively affect his utility. In other words, a case of NIMBY occurs when any of the perceived impacts of wind power such as noise, visual annoyance or landscape intrusion affect the citizen in question in a way that he opposes to the development of an idea he originally supported in its principles.

The phenomenon has been analysed extensively and the view that it is one of the major obstacles to the growth of wind energy has been prevalent in the past. However, there is also a growing scepticism within the literature regarding the conditions under which a citizen's attitude can be characterised as NIMBY and to what extent the phenomenon actually affects the implementation process.

7.3.3.1 NIMBY explicitly defined or used as another "label" of opposition

Analysing the ways that the NIMBY phenomenon is being approached within the reviewed literature on public attitudes toward wind power, we can anticipate a variety of patterns. There are a number of studies that accept the occurrence of NIMBY either as an implicit phenomenon or as a finding of a broader survey. Gamboa & Munda(2007), in the introduction of their multi-criteria analysis, refer to the phenomenon as one of the key factors that influence the perceived opposition to a wind park without expanding further on this argument. Urban (2004) in his research regarding the policy evaluation of new approaches toward wind power implementation refers, in various instances, to NIMBY as an existent and, in some cases, strong phenomenon. However, although he adequately defines NIMBY, his approach of appointing it to an abstract majority of the Dutch

population can be questioned. An interesting approach toward NIMBY and rather commonly met in the broader literature regarding wind power implementation is followed by Michaelowa (2005). In an article about the German Wind Energy Lobby and its role in promoting wind energy, the author refers to NIMBY as a "backlash" and as a factor that led to the change of the German Renewable Energy Law, leading to a shift toward offshore wind power development (Michaelowa 2005). Additionally, he considers NIMBYism as the only threat to wind power, an argument that raises the question of what is actually being implied with the use of the term in this particular article. Considering that, in this case, NIMBY is not being defined, it can be realised through the article's analysis that the author is addressing it when referring to local opposition in general.

Therefore, that case is an example of the use of the term as a *fitting label* in order to characterise a complex phenomenon rather than for its actual meaning.

The issue of NIMBY "labelling" can be observed from the results of a survey conducted for The Times in the UK, summarised by the British Wind Energy Association (BWEA). According to the study, 81 percent of the examined population considers the objection to the construction of wind power in their local area as NIMBYism (BWEA 2005). This remarkably high percentage, however, raises the question of whether the phenomenon is adequately defined on the background of a study on public attitudes or if it is just being used in order to attribute the complex process of local opposition to one single variable.

With the above discussion, it is not being implied that NIMBY is only another "label" of opposition or that it is overestimated regarding its significance to the research on public perceptions. *On the contrary, the phenomenon has been observed as a finding in various studies and, moreover, there are studies that adequately use it as part of their corresponding theoretical analyses*.

However, in both of the cases, NIMBY has been either adequately defined or used with more caution. For instance, Gipe (1995) in reference to a survey conducted in Wales by the Department of Trade and Industry, highlights the finding that half of the interviewed population supports further wind development on the local level, while 82 percent supports further wind development in another area. The interesting part of this example is that the author refers to it as a situation that "…may reveal a subtle NIMBY phenomenon…"(Gipe 1995:281). He does not directly conclude that this case is an example of NIMBY, a pattern which is met in other examples of the literature (e.g. Kaldellis 2005). On the contrary, the researcher is being more cautious by implying that there might be different explanations for this finding. Therefore, he leaves the area open for further investigation and this is obviously an important factor regarding the research on public perceptions. It prevents it from being narrowed down to single parameters.

Finally, in a study regarding wind power in Ireland, the NIMBY factor can be observed as part of a systemic analysis of the environmental and social parameters that affect the development of wind power (Houlihan 2002). In that case, Houlihan describes NIMBY both as a factor that affects the willingness of local communities to adopt wind power and as a factor that is affected by the amount of public knowledge on wind energy issues and the concerns of the public and action groups (Ibid). Regardless of the legitimacy of the above systemic argumentation, the NIMBY phenomenon is being adequately analysed in its meaning in a latter part of the study.

It can be concluded that any similar use of it as a parameter of the research on public perceptions should be considered by the reader as valid.

7.3.3.2 The NIMBY explanation: Accepted and criticized

An identified pattern of the use of NIMBY in the reviewed literature is the simultaneous realization of it both as a granted phenomenon as well as a contestable concept. Its acceptance as a possible factor that influences the implementation of wind power is based on findings of surveys or references from different authors. On the other hand, the criticism of the ways that NIMBY is being referred to is mainly based on Maarten Wolsink's research on the issue. This pattern can be observed in a number of studies on public perceptions regarding wind power (e.g. Jobert et al 2007); however, the most representative example is the related study of Krohn & Damborg (1999). In that case, the authors, using examples of previous surveys conducted in the UK, initially identify the existence of NIMBY as a situation where the percentage that support wind power development for a country is larger than the corresponding percentage for a wind power project in a particular area (Krohn & Damborg 1999). Additionally, there is a correlation of the phenomenon with the level of citizens' knowledge and experience with wind power projects. They referred to a study of the BWEA according to which the acceptance of a wind project in the UK was higher after its completion. In that way, the authors demonstrate an adoption of the phenomenon in order to evaluate the results, without accounting for any potentially different explanations and despite the fact that they have adequately defined NIMBY early in the study. Nevertheless, in the following paragraphs of their research, they provide the reader with the counter-argument, using the contradictory results of a survey in the Netherlands. This showed that the appointment of the NIMBY label in all cases where the acceptance of wind power, in general, is larger than the respective one of a local wind project, might not always be a correct method (Ibid). *Therefore, it is considered essential for a study on public attitudes, to be conducted by considering the maximum amount of possible arguments*

The use of the NIMBY term, in order to describe the reasons for public opposition in the respective literature, has been widely criticised by various authors. The majority of the researchers that either criticise or test the validity of the so-called NIMBY hypothesis base their arguments on the findings of Maarten Wolsink (2000; 2007b; 2007a). He has extensively explored the function of the phenomenon and its influence on wind power implementation. According to Wolsink (2005), the view of NIMBY or, in other words, the idea that people tend to oppose wind power projects for selfish reasons, is a simplistic one. Therefore, it should not be perceived as a standard reason for explaining public opposition. By referring to several examples of the literature where the NIMBY phenomenon has been perceived as an expression of pure self-interest, Wolsink (2000) raises the question of whether the citizens' perceptions of risk should be disregarded. Consequently, with the help of a survey of reversed-logic questions that highlighted the presence of a social dilemma, Wolsink concluded in a convincing way that the NIMBY explanation for every opposition to wind power was unfounded (2000).These overall viewpoints have been, in some cases of the reviewed literature, simply adopted (Khan 2004; Ek 2002), tested through surveys (Ek 2005; Warren et al 2005) or further expanded (Söderholm et al 2007; Devine Wright 2005; Devlin 2002) by the researchers. Moreover, Wolsink (2007a; 2007b) himself, expanded his initial findings. With the use of sophisticated statistical methods, he managed to confirm in a sufficient way his theory that NIMBY is rarely the reason for public opposition and concluded that the problem lies in the decision making process.

Considering the large amount of researchers that adopt Wolsink's ideas and accept his scientific findings, it can be argued that Wolsink has influenced to a great extent the reviewed research. Van der Horst (2007) bases the framework of his study on Wolsink's findings and provides an extensive research on different parameters that affect public attitudes. Additionally, he focuses on the negative effect that the NIMBY labelling has on the citizen's themselves and their

projected attitudes. Concluding, he constructs a list of different reasons on why NIMBY needs to be properly defined in a study and calls for further research according to the model of Wolsink, on the qualitative and quantitative levels (Van der Horst 2007).

Regardless of the researchers findings, the fact that, in recent years, they have become sceptical toward the role of the NIMBY phenomenon in the implementation process of wind power schemes should be considered a positive step for more substantiated research results. It would be a negative fact for the research on wind power implementation to be shifted toward a discourse where a complex social situation is being uncritically labelled as NIMBY. A fair number of such studies would potentially lead to a decreased understanding of the problem and, consequently, to a faulty decision making process. As Wolsink (2007b) notes, 'the damaging consequence of connecting the discussion...to the ultimate label of selfishness and ignorance-NIMBY- is that it leads to the disregard of important elements of the issue'.

7.4 Sustainable development within the research of public perceptions

7.4.1 First observations

As it was analysed in the theoretical part of the study, the concept of sustainable development is an emerging and fairly influential idea in our contemporary society. It largely involves both environmental and social issues, a fact that, on the theoretical level, makes it relevant to the issue of wind power and the social implications that the implementation of this technology has. It is, therefore, essential within the purpose of our study to examine in what ways this concept is presented in the literature regarding public perceptions.

A first observation of the literature regarding the reference to the concept of sustainability demonstrated a remarkable lack of it in the vast majority of studies. The only types of studies that have relatively extended discussion to sustainable development are the analytical theses conducted for academic dissertation purposes. However, notions of sustainability, such as democracy and equity, as well as the conflict between different aspects of sustainability within the issue of wind power development, have been addressed by a number of studies. However, they are not defined in relation to the general context of sustainable development. These studies will be included, as well, in the analysis in order to support the composition of the literature's profile regarding its correlation to sustainable development.

7.4.2 The reference to sustainability in the literature

Analysing the frequency that the terms "sustainability" or "sustainable development" are being referred to in the reviewed literature, we can observe that this type of reference is rare and in the cases where it occurs, it happens in a rather abstract way. Exceptions to that pattern are the extended master or doctorate theses that were included in the reviewed literature, which provide extended definitions of sustainability and analyse the issue of public perceptions toward wind power within the context of sustainable development (Khan 2004; Devlin 2002; Houlihan 2002). It is possible that restrictions of space did not enable the rest of the studies to follow a similar analysis. In any case, though, it can be argued that, when referring to sustainability, a proper definition of it would be a positive attribute.

A number of the studies on public perceptions refer to sustainability in the introductory part. It is a common pattern to mention the term regarding the need for a shift to renewable energy sources or wind power due to the emerging climate change threat. Therefore, the phrase "sustainable energy production" and the need for it is stressed in the introductory parts of various studies (e.g. Toke et al 2007;Wolsink 2007a; Kaldellis 2005;Strachan& Lal 2004; Devlin 2002;Alvares-Farizo& Hanley 2002). However, few of the studies expand on what that phrase

implies. For instance, Strachan& Lal (2004), refer to the two main patterns followed by the literature regarding wind power. They state that the one that addresses sustainable energy has its main focus on the policies and economic regulations needed for the implementation of wind power. In that sense, Strachan& Lal stress the connection between clean energy production and economy, in a broader sustainability context.

The meaning of the term "sustainable energy" is not explicitly defined in the studies where it is met. It can be assumed that, in this case, "sustainable" is being used as an alternative word for "green" and not as a word, which represents a complex theoretical concept. This fact verifies, in a sense, as mentioned in the theoretical part, the critique on sustainability that it is used in some cases as a "buzzword" instead of a term that contains a deeper meaning.

7.4.3 Studies that advocate sustainability ideas

The discourse of sustainable development can be identified in a variety of studies regarding public perceptions toward wind power development. *This happens through the integration of two or, in some cases, three of the environmental, economical and social aspects of the studied case.* Studies which include such forms of integration are considered as essential for our analysis for the fact that they demonstrate the presence of the notion of sustainable development in the studied literature, even though the authors never conceptualise their analysis as such. It is worth noticing that the most characteristic cases of such studies are the ones that classify themselves as multi-method or multi-criteria ones.

The study of Gamboa & Munda (2007) regarding the problems of windfarm location is a representative example whereas the environmental, economical and social parameters are being incorporated. In particular, the authors analyse a case study of wind farm location in Catalonia and they aim in showing that the application of a social multicriteria evaluation (SMCE) framework is suitable for researching wind power location problems. Regarding the main attributes of SMCE, it focuses on: i) the relationship between policy maker and analyst, ii) the use of participatory methods for collection of opinions and data, iii) the cyclic nature of the evaluation process, where feedback from the participants changes the assumptions made and iv) the use of simple mathematical algorithms for verification of the results (Gamboa & Munda 2007). Under these principles the authors identify the role of the social actors of the area toward the problem and construct seven alternatives. Consequently, by applying the technical interpretation of the actors' preferences and needs, they compile a set of evaluation criteria classified in economic, social, socio-ecological and technical ones. For instance, an economic criterion is the 'land-owners income' from the installation of the turbines; a social criterion is 'the number of jobs created' in the operation phase, while the 'visual impact' and the 'reduction of CO_2 emissions' are considered as socio-economic criteria. Accordingly, a number of indicators or scores is attributed to each criterion and following mathematical algorithms for ranking and a logical analysis, the authors conclude to the proposal of the most desirable alternative solutions (Ibid). Regardless of the results, it can be argued that the aforementioned study applies, in an efficient way, the provisions of the three sustainability "pillars". The terminology is different from the one used in a sustainability discourse; for instance the 'socio-ecological' criteria correspond to both environmental and social pillars. However, a compatibility regarding the basic ideas applied is being observed. Sustainable development means integration of the three "pillars". Therefore, a study that is aiming to assist in the wind power decision making process, having as guide for its methodology the same or similar principles, can be considered as a study that advocates sustainability. As a result, *it is of minor significance to be labelled as such.*

A similar approach is followed by Cavallaro & Ciraolo (2005) in their study of evaluating wind energy plants on an Italian island. The authors select the appropriate criteria that will aid them

to assess the alternative proposed wind power development solutions for a specific island. They stress the fact that this selection needs to be carried out with great consideration. In this case the criteria are being divided in economic/technical and environmental ones; therefore one can argue that the social based criteria are not included in the assessment. *As a result, in a way, two of the sustainability "pillars" can be identified on the first place, though, similarly to the previous study, they are set in a different background.* Moreover, it can be observed that the principles of selecting economic/technical criteria such as 'investment costs' or 'energy production capacity' are well defined while the same is not realised for the environmental criteria. According to the authors, the reasoning behind the selection of the latter criteria is based on environmental protection and the principle of sustainability. However, considering the fact that sustainability is not being defined in any part of the study, it can be argued that the reference to the term has no specific content. It is necessary to clarify that the environmental criteria, such as 'CO_2 emissions avoided', 'visual impact' or 'social acceptability' (Cavallaro & Ciraolo 2005), are adequately defined in an individual basis and any objections expressed are focused to the context they are being placed at.

A common observation from both the studies of Gamboa & Munda and Cavallaro & Ciraolo is that they attempt to incorporate multiple criteria within the economical, social and environmental context in order to assess the viability of the different alternative solutions for each case. However, there is lack of clear definition of the terms used for the assessment as well as of the framework they refer at. On the other hand, the methodology applied as well as the mathematical analysis of the data with the consequent aggregative results provide with results of remarkable precision. In that sense, this kind of studies can be considered as important tools for decision makers and researchers, provided that the selection criteria of the data used are carefully examined on the theoretical level. It can be argued that both of the studies never state that they are applying the principles of sustainable development in the broader theoretical framework of selecting evaluation criteria. They do not claim to be "sustainability studies" and therefore they should not be criticised for not focusing on this concept. However, this analysis does not aim in labelling a study as "unsustainable". It focuses in examining potential common arguments of a multi-criteria study with the concepts of sustainability.

Finally, a striking example where the difficulties in wind power implementation are approached from multiple perspectives is the conjoint analysis performed by Alvares-Farizo& Hanley (2002)

. They attempt to quantify public preferences over the environmental impacts of wind farms in Spain. In that case, the authors apply a statistical method to assess a set of alternative options of wind power development in an area. They mainly consider the environmental impacts that this development would have on the local area; namely, visual, flora and fauna and landscape impacts. They conclude that wind farm developments are likely to create significant social costs related to their impact in their local environment and that it is necessary to find ways to reduce these costs and increase the net benefit of the investment (Alvares-Farizo& Hanley 2002). Regardless of the details of the statistical method (contingent rating) applied, which are out of the purposes of this thesis, the logic followed by the authors with the use of conjoint analysis shows that they attempt to incorporate social, environmental and economical parameters with the use of terms and arguments such as 'social costs', 'net benefit' and 'environmental values'. Moreover, although not specifically addressed, their study is a demonstration of the conflict that the implementation of wind power creates within the paradigm of sustainability. The authors mention in their introduction that wind power is a technology that promotes sustainability, probably referring to its environmental part, with its contribution to the reduction of CO_2 emissions (Ibid). However, in their analysis they stress the local environmental impacts that wind power parks can have and therefore it is being implied that, on the local level, the technology might not be as environmentally sustainable. Therefore,

although this conceptualization was not on the authors' purposes when conducting the study, an illustration of the conflict within the same idea was realized.

7.4.4 Studies that illustrate the conflict

The conflict between different aspects of the same paradigm of sustainable development, as it is being observed in the case of wind power implementation, is being addressed by a number of the reviewed studies. However all of them define the issue in different ways rather than a conflict within sustainability. *A striking exception* is the article by Christensen & Lund (1998) who title their article regarding wind power in Denmark, exactly as 'conflicting views of sustainability'. In this article, the authors address both the conflict between the environmental and social implications of the implementation of wind power schemes, as well as the potential clash between global and local environmental impacts that the development of wind power has. Christensen & Lund (1998) describe the success story of the wind power implementation in Denmark from the perspective of the methods that the Danish government applied in order to account for the social and local environmental impacts that this environmentally benign, on the global level, technology has. The authors stressed the fact that institutional changes, such as the local co-ownership schemes and subsidies, were required in order to ease the public opposition. In that way, they demonstrated the nature of the clash between environmental benefits and social reactions in this case and highlighted the solutions that assisted in the mitigation of the problem. Additionally, the impacts of wind power development to the local landscape and the visual annoyance expressed by citizens called for a need to merge these claims with the overall advantages that RES have for the environment over the conventional power sources (Christensen & Lund 1998). In other words, *the authors highlighted the need of reconciliation between local and global environmental sustainability*. By using the Danish example, they showed that changes in regional planning, such as zoning systems and scaling up of traditional wind turbines, is a potential way of integrating the two views in an effective way.

The conflict observed within the paradigm of environmental sustainability has been referred by a number of studies on public perceptions toward wind power in different ways. Warren et al (2005), in their study regarding public perceptions of wind power in Ireland and Scotland, refer to the above environmental controversy as a 'Green on Green' dimension. Their research tests the NIMBY hypothesis, the fact that citizens' perception becomes more favourable after the construction, as well as the change on citizens' perceptions toward wind power parks in relation with their proximity to the wind turbines (Warren et al 2005). In their introduction they provide with a background of the, according to them, three existing stances toward wind power based on their conflicting environmental views; i) the ones that support wind power because of its benefits in mitigating the greenhouse effect, ii) the ones that oppose it because of its impacts on the landscape and iii) the ones that are left in the middle, supporting wind power as an idea but opposing its implementation in the local level (Ibid). In that way, we can observe how the *clash within the paradigm of environmental sustainability can define the background and the basic assumptions* of a case-specific study on public attitudes toward wind power. Therefore, such theoretical considerations regarding conflicts between sustainability paradigms are not simply proved within the research on public perceptions toward wind power; in many cases they initiate the research itself and define the agenda and the methods followed by a study.

Van der Horst (2007), analyses and tests the different patterns followed on the literature regarding the NIMBY phenomenon in wind power implementation. He concludes that there is need for more in-depth qualitative research on exploring '…the tensions between positive social or environmental attitudes in principle and actual social or environmental behaviour in practice' (Van der Horst 2007). The above quote demonstrates that the research on wind power implementation is perceived by some authors as a research that could be also based on a broader theoretical

background of conflicting views rather than just aiming to quantify different types and causes of public attitudes.

7.4.5 Democracy and equity on the research on public perceptions

The final part of this analysis is an attempt to identify the ways that the more specific principles of sustainability, such as democracy and equity, are addressed in studies regarding wind power implementation

7.4.5.1 Democracy

Democracy, in its participatory form, is arguably not frequently addressed in the literature. Although most of the studies analyse and advocate the increase of public participation in the planning process, only few of them expand in analysing participation as one of the fundamental principles of democracy. It is necessary to notice that the opposition of a person to a wind development of an area is a totally democratic stance, provided that it is expressed with legal means. However, within the reviewed literature, the opposition is rarely expressed as a democratic right and the reasons for the appearance of that pattern are questionable.

There are few examples that democracy is being addressed within a study on public perceptions. For instance, Loring(2007) states that public participation in wind power planning is necessary due to its direct connection to democracy. A striking exception of research that analyses in depth the issue of participation and democracy in relation to wind power implementation is the study by Jamil Khan (2004). The author evaluates in depth the local politics of renewable energy schemes, particularly wind energy and biogas, and focuses on two areas of interest, i) planning and management of projects and ii) handling of conflicts with the method of local participation. In his analysis on the role that local participation can have in the decision making process he distinguishes three perspectives existing in the literature, based on a) risk communication, b) environmental movement and c) participatory and deliberative democracy (Khan 2004). Consequently, a matrix is constructed showing the differences of the three perspectives in relation to a series of criteria such as the 'main research problem', 'the goals of participation', 'the view of conflict and consensus', and 'the focus of research' according to each perspective. For instance, the 'main research problem', according to the democratic perspective of local participation, is the lack of citizen involvement and dialogue and 'the goals of participation', according to the same perspective, are the increase of knowledge and democratic capabilities of the citizens. In that way a wide and explicit beam of definitions regarding the meaning of local participation from a democratic perspective is constructed. According to the author, its provisions can be applied by the decision makers in the case of local conflicts regarding wind power implementation projects (Ibid).

The above example demonstrated how a principle of sustainability such as democracy can be associated with the conflicts emerging from the implementation of wind power in the local level. Consequently, it shows how the analysis and mitigation of a problem by a research, from the perspective of democracy, can provide the decision makers with significant results.

The importance of accounting for the principles of democracy in a society when researching the problems of wind power implementation is demonstrated by the study of Bell et al (2005) where the authors analyse the reasons that a 'social gap' exists in wind farm siting decisions. The authors take *a different approach* on the role of democracy in this matter. They identify the causes that situate an opposing minority to dominate the permitting process of a wind park, a phenomenon which they refer to as 'democratic deficit'. They stress the difference in opposing and supporting outcomes. The supporters know that their attitude will contribute only a little part to the goal of developing wind power in the global level, while the opponents believe that their stance will

contribute enough to support their goal which is the protection of the local landscape (Bell et al 2005). The authors also point out that the outcome of the opposition depends on the context of each case and on the educational and socio-economic profile of the opponents. Consequently they discuss possible solutions to overcome the democratic deficit, such as public vote or opinion surveys. However they claim that these methods might solve this particular deficit but create undemocratic situations on a different level. They reach to the conclusion that local participation is possibly the optimal solution as long as it is held in a collaborative rather than confronting manner and as long as it involves active participation rather than mere consultation (Ibid).

The above example illustrates the different interpretations that the concept of democracy can have in the discussion of wind power implementation. As it was mentioned above, opposition to a wind project is a democratic right of every citizen, while Bell et al (2005) noted that the domination of the opinion of the few opponents over the one of the supporters is a case of democratic deficit. Therefore, it can be argued that for the case of wind power the conflict is not only located between the level of local and global environment or between the environmental and social "pillars" of sustainability. *It is also met within deeper and more specific principles of sustainable development such as democracy*. In regards to the research on public perceptions toward wind power, the inclusion of the above conflicting paradigms as a theoretical background that would structure the methods of a study is indeed a complicated procedure. The conflicting sides advocate decent purposes in all cases and their respective arguments can be the basis of a study on public perceptions provided they are explicitly weighed in an objective manner.

7.4.5.2 Equity

Regarding the relation of equity as a sustainability principle with the reviewed research on wind power implementation, it was observed that *it was not accounted for*, apart from some notable exceptions. The development of wind power, following the provisions of the Kyoto protocol can be interpreted as an effort to establish both intra and intergenerational equity within our societies. However, there are studies that advocate that the implementation of wind power on the local level might be an action against the principles of equity, referring to its intragenerational part. Van der Horst (2007) raises the question of environmental equity when he examines stigmatised places, from the presence of heavy industry, whose citizens would welcome a wind power project. On the other hand, Wolsink (2007a; 2007b) expands more on the issue of equity and he relates it directly with the phenomena of public opposition. In his survey, he observes that NIMBY, in the cases that it actually occurs, is a result of the citizens feeling that they have been treated in an unfair way rather than citizens being selfish and attempting to shift the burden to others (Wolsink 2007a). Although the author does not specify explicitly the kind of equity he is referring at, it can be anticipated that this principle of sustainability is addressed in this study in a unique way.

It can be concluded that, the reader, be it researcher or decision maker, has the opportunity to observe the situation of public opposition from a different angle. This is a different pattern from the classic simplified explanations that are commonly used to explain the phenomenon. Secondly, a conflict within intragenerational equity is being observed in the case of wind power implementation. That fact, accordingly with the case of democracy, demonstrates the complexity of accounting the principle in the theoretical background of a study.

8. Findings-Discussion-Suggestions

In the following part of our study, the findings of each part of the analysis (Table II) will be summarized and discussed. Finally, suggestions will be made on how research on wind power implementation or on public perceptions toward wind power can be efficient.

Table II : The basic findings of the analysis

Background themes	• **Culture and awareness were not explicitly addressed in the studies.** • **The wind potential defines the methodology of some studies.** • **Case-specific studies account for the differences in local politics.**
Main patterns	• **The arguments of the environmental organizations set the methodological framework of many studies.** • **Local participation was referenced as important in multiple cases. However, it was inadequately defined in many studies.** • **The NIMBY phenomenon is discussed in most studies. The criticism of its poorly defined and simplistic use in the research is substantial.**
Sustainability reference	• **Sustainability was rarely referenced in the studies, apart from a few examples where it was not defined.** • **Multi-method studies are compatible with the paradigm of sustainable development.** • **The conflict between the pillars of sustainability is being addressed by studies; however, in a deferent theoretical context.**

8.1 The three background themes

Regarding the three research background themes of culture and education, wind potential, and local policies, an overall conclusion can be made that they are not adequately addressed in the examined studies. However, their importance is relative regarding the division of the studies into case-specific, comparative and overall studies on public perceptions.

The parameter of the *cultural background* of an area should be considered important when comparisons are made between the implementation processes of wind power projects of different locations. Different cultures have different perceptions toward technological developments and different attitudes toward the value of their landscape. On the other hand, on a discussion regarding public perceptions in a general and theoretical manner, the cultural aspect requires extensive analysis of its impact on the phenomenon. Therefore, an assumption that it is out of the boundaries of research can be justified. The cultural background of an area is an intrinsic characteristic and a *case-specific* study needs to focus its interest on how to incorporate it into the case of wind power implementation rather than attempting ways of changing it or dismissing it. Similarly, Devine – Wright (2005), in his study of comparing and analysing the key issues addressed in the literature of public perceptions toward wind power, concludes that research on public perceptions should attempt to incorporate culture (Devine-Wright 2005).

The level of knowledge of the citizens regarding wind power is also addressed in different ways in relation to whether the study is a case-specific or a comparative one, yet not extensively. Generally, based on the fact that the acceptance of wind power in the countries of the EU is at a relatively high level, the researchers are sceptical as to whether it is actually a parameter that influences the perceptions of the public. Indeed, there were only a few cases in which the awareness level of the citizens about the benefits of wind power was considered as a parameter that defines their attitudes toward a wind project. These were mainly studies that propose the increase of educational campaigns regarding wind power. They answer to situations where unsubstantiated arguments against wind power projects were made by a part of the population. However, these cases are limited throughout the examined literature and this fact demonstrates that the citizens appear to be, generally, well informed regarding wind power. The focus of the studies on different parameters, rather than the level of awareness, shows that there is a trend to systematically evaluate and account for the citizens' arguments against a project rather than dismissing them as outcomes of

ignorance and lack of education. In any case, the constant education of a population should be implicitly a proposal in any study, regardless of the acceptance or not of wind power projects in an area. It is considered a fundamental factor that improves the accountability of a community's arguments.

The parameter of *wind potential* of an area is a technical issue that has an impact on the accountability of a study's methodology and conclusions rather than on the public perception of the citizens itself. It is a case-specific parameter that needs to be addressed in the background of a study on wind power implementation. The proposal of alternative solutions regarding the location of a wind power project needs to be based on this factor. It was found that this parameter was not explicitly addressed in most of the studies. Moreover, some studies were suggesting alternative locations for construction of a wind project without establishing whether these had the required wind resources for economically efficient development. On the other hand, there were few examples of studies that, based on technical measurements, restricted their research to public perceptions within the suggested locations of installation. These studies provided solid results of suitable locations, always depending on a series of variables, including the perceptions of the public and their suggestions. In that way, the attitude of the public can be considered in combination with the efficiency of a wind power project. Therefore, the proposed solution will be beneficial from all aspects, even if it implies the cancellation of a wind project.

Finally, the role of the local policies is essential to be included in case-specific studies. It was found that the majority of the studies address the policy of a country regarding wind power; however, mostly regarding the support mechanisms provided by the developers. The specific ways in terms of a planning policy that a country applies to the implementation of wind power schemes were addressed in few studies. They verified the argument that the institutional background of a country can influence, to a great extent, the outcome of the implementation process and, in some cases, the attitude of the public as well. Similar to the factors of culture and education, the local policy of a country should be considered as a background parameter. A notable difference is that a study on public perceptions can assist in changing these policies in cases where they are found to have negative impacts on the attitudes of the public toward wind power. The policy of a specific country is a background parameter of a case- specific study on public perceptions. On the other hand, when it is considered by a study, it is automatically evaluated in relation to its impact on public perceptions. *In that way, the understanding of the implementation problems of a wind power project is enhanced and an additional possible explanation for where these derive from is offered.*

8.2 The main patterns of the research

Regarding the topics that were considered important for wind power planning as well as for the research on public perceptions, it was found that they were referred to extensively in the literature.

The role that the *local environmental groups and media* have on forming the perceptions of the public and influencing the wind power implementation process was considered in various ways by the respective studies. It was discussed that these groups are the "communicative carriers" of the opponents of a wind power project. Therefore, it was important to identify to what extent these "communicated" arguments influenced the studies. Issues of lack of objectivity were observed, on the part of the studies, in cases where they were taking a dismissive stance toward the arguments of the environmental groups. On the other hand, other studies considered the arguments of the media or the environmental groups as the prevalent ones in the debate and they avoided investigating further reasons or patterns of opposition in the case. Consequently, they focused their research on attempting to find solutions to confront these arguments rather than attempting to investigate further causes of implementation problems. *It can be argued that an ideal approach would lie somewhere*

in the middle of the two cases. It is a fact that the opinion of the environmental groups and media rarely represents the majority of the involved public. It is also a fact that research needs to consider these "communicated" opinions, since they are one of the reasons that the debate on wind power implementation was initiated on the first place. However, research on public perceptions should be planned independently of these opinions, which should be tested with regards to the results of the study. In that way, a study reduces the chances of skipping data or arguments that might be scientifically valuable and, moreover, it manages to maintain its objectivity on the issue.

The issue of *local participation* was the most broadly discussed topic in the examined studies. This fact demonstrates its relevance and importance in public perceptions and the corresponding research. Local participation is acknowledged by the majority of studies in two ways: i) as a necessary part of wind power schemes planning in order to minimise potential conflicts and ii) as an implicit solution of stalemate cases where projects have been opposed by the public. The participation through the method of economic incentives offered to the affected citizens is approached in a rather conservative way by the studies. This is due to the fact that they do not want to be misjudged as studies that suggest bribery methods for mitigating the opposition of citizens. A second reason can be identified in the general philosophy of these studies to approach the case from a sociological point of view, which would exclude any economic parameters.

However, *the basic and common problem* that was identified in the majority of the studies regarding their reference to local participation was the lack of substantiated definitions and explanations of the term. Participation was mentioned in multiple ways; either as information or consultation prior to the construction of a wind park or as active participation in the planning process. These distinctions, though, were clearly formulated in very few of the reviewed cases. Moreover, a general feeling that emerged through the examination of the studies was that the concept of local participation was rather arbitrarily appointed as a standard solution to implementation problems. The increased frequency of unsubstantiated use of public participation as a universal "master key" solution decreases its initial importance as an argument and tends to constitute it as a common buzzword of no applicability. There were important exceptions observed, among multi-method studies, where participation was well defined. This happened both in terms of indicating the status of the wind power planning procedures as well as in terms of constituting a suggested solution. When such definitions occur, not only concerning public participation, but for all parameters of the research on public perceptions, then the corresponding results are more comprehensive and obtain an increased scientific validity. Therefore, the use of such methods for researching public attitudes provides the developers, planning authorities and future researchers with useful tools for increasing the potential for understanding the parameters of the issue and allowing for a successful implementation process.

A great majority of the reviewed studies had dedicated part or all of their analysis to the explanation of the *NIMBY* phenomenon and its implications for wind power implementation. It was acknowledged by most of the studies as an existing and, in some cases, prevailing form of public opposition. However, the variations of the approaches that the researchers took on the topic were plenty. Similar to the case of local participation, the NIMBY phenomenon was addressed in an unsubstantiated way in many cases, mostly due to the poor definition of the concept. There were extreme examples where NIMBY was applied as a "label" to all cases of public opposition in an attempt to explain the implementation problems in areas where the acceptance of wind power is high. These cases also demonstrate a lack of objectivity in the sense that they attempt to present the public as having selfish motivations and, therefore, constitute their arguments as invalid. This attitude on the part of the researchers has an effect on other cases where the perceptions of the public are studied. The citizens do not wish to be labelled as NIMBY's and, therefore, they avoid expressing any opposition to wind projects, even though they initially had. In these cases, we

observe that a study not only does not contribute to the understanding of the public perceptions, but it indirectly influences the results of other studies, in a negative way.

On the other hand, the critique of the observed NIMBY labelling has been increasing in the most recent studies. Many observe an actual appearance of the phenomenon in many cases. However, they stress the fact that there are other important parameters that can explain the public attitude or opposition and that the NIMBY explanation is only in few cases the prevailing one. It is obvious from this discussion, that a study on public perceptions toward wind power is necessary to expand the areas to which it is applied for understanding the wind power implementation problems. It can be argued, that the research has been misled and delayed by the NIMBY labelling phenomenon. This fact that can be realised by the number of studies that allocate valuable space and time in order to explain why this phenomenon should not always considered the reason for public opposition. On the other hand, the shift of the research to other issues such as efficient planning or local participation and policies, instead of being monopolised by the NIMBY issue, is a positive step. In that way, the future reader, a researcher or a policy maker, can evaluate the nature of wind power implementation problems in a holistic way.

8.3 Sustainable development in the research

Regarding the consideration of the paradigm of sustainable development in the research on wind power implementation, it was found that it was absent in the great majority of the cases, especially in the formal part of their methodology definition.

The term “sustainability” was used in a number of studies, usually in their background, in reference to the need for sustainable energy. However, no further correlation to the concept was made in these studies. As a result, the use of the term can be considered as arbitrary or even as an attempt to establish a sense of objectivity in the respective case. ‘Sustainable development’ is emerging as a universally accepted term and it is questionable whether the majority of the studies that refer to it consider all of its underlying meanings or they just use it instead of ‘green’ development. Therefore, once more, a lack of a proper definition of the used terminology is observed, this time with unclear motivation by the authors. It can be attributed to a lack of experience on the concept, to an attempt to employ a popular buzzword in order to draw the attention of the reader or even to a lack of space for analysis of concepts broader than the actual purpose of the study.

The lack of the concept of sustainable development within the examined studies does not imply that it was totally absent from the research on wind implementation issues. On the contrary, partial aspects of sustainability such as environmental or social sustainability were addressed in a variety of studies, however using different terminology. Similarly, the initially observed conflicts between local and global environmental and social sustainability are illustrated by a number of studies regardless of the differences in the theoretical context in which they are placed. This can be observed in the reference of few studies to the significance that sustainable development provisions, such as democracy and equity, have to a discussion on public perceptions. It can be argued that the research on public perceptions and wind power implementation may not have an overall direct reference to the concept of sustainability. On the other hand, parts of this concept appear, although scarce, in many cases. Therefore, it would be unjustified to characterise the average research as having no sustainability orientation.

8.4 Conclusions

The factor that characterises the great majority of the examined studies and arguably the broader research on public perceptions toward wind power projects is the lack of a holistic and thorough approach, based on a common theoretical framework. This was felt during the conducting

of this thesis through the difficulties in identifying common patterns and themes in studies that had common or similar purposes. Moreover, as it can be observed in the Appendix I, regarding the occurrence of each pattern in each study, very few of the studies are including all of them in their analysis. Therefore, a fragmentation is observed, regarding the themes in a study on public perceptions or wind power implementation issues. This fact, along with a several other deficiencies, has been observed and verified by a number of studies either reviewing the research on public perceptions (Devine -Wright 2005) or being parts of the reviewed literature (van der Host 2007;Loring 2007;Toke 2005; Strachan & Lal 2004). The theoretical framework of a study is an important characteristic of it for the reason that, in studies in which it is applied, the results regarding the attitudes of the public can be explained in detail, instead of being simply described (Devine-Wright 2005). In that way, the understanding of the implementation difficulties of a project is significantly increased, a fact which might be less likely when the results of the studies are the accumulating and varying data of no substantiated explanation.

It is an argument of this study that the concept of sustainable development can provide the theoretical framework that is required in order to conduct a study on public perceptions in a holistic and inclusive way. This can be achieved by the facilitation of a study on the context of the three or four interacting "pillars" of sustainable development. As it was discussed, the multi-method studies on wind power implementation (Gamboa & Munda 2007; Hagget & Toke 2006; Cavallaro&Ciraolo 2005) demonstrate some of the characteristics that a holistic and interdisciplinary research can contain. However, they also have significant differences between them regarding their methodology and areas of focus. As it was demonstrated in the theoretical part of the thesis, the issues of wind power implementation and public perceptions involve the interaction of all three pillars of sustainable development and it is argued that the research on these issues should be based on the implications that this relationship contains. A similar approach to the proposed one has been followed in studies on implementation or planning problems of other developments, such as mineral exploitation facilities, where the study is being carrie out on the conflict between equity and the governmental goals for sustainability (Cowell & Owens 1998).

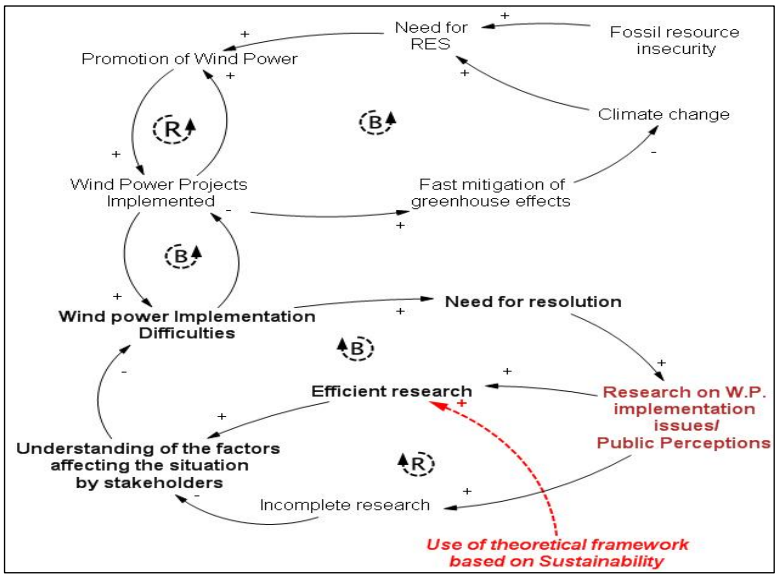

Figure 3: The impact of a Sustainability framework on the research

Focusing on the conflict between different ideas of sustainability can be an alternative way of theoretically founding a research on public perceptions toward wind power. In that way, a holistic approach addressing the maximum amount of competing arguments, instead of a single-sided description and justification of the opposition toward wind power, is certain to contribute greatly to the understanding of the drivers of this complex issue (Figure 3). This proposal is rather ambitious in many ways, particularly in terms of the amount of financial and institutional resources that such an interdisciplinary research would require. However, a well facilitated research would have a positive impact on the understanding of the implementation process of wind power projects and, in the long term, it would consequently contribute to the mitigation of the problem of climate change (Figure 3). It is obvious that the benefits of conducting such research outweigh the costs.

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Appendix

Wind Power Background Information

Wind power technical background

- The power output of a wind turbine can range from tens of watts to 5 MW depending on the size and the characteristics of each device.
- Every turbine has a characteristic wind speed-power curve that demonstrates in what way the power output varies in relation to wind speed. The shape of the curve depends on various properties of the wind turbine such as rotor swept area and number of blades as well as the aerodynamic, gearing and generator efficiencies (Boyle 2004:265).
- The electricity produced from a wind turbine is dependent on both the wind speed-power curve as well as on the wind speed frequency distribution, or in other words, "the number of hours for which the wind blows at different wind speeds during a given period of time" (Boyle, 2004:266; Elliot D. 1997:88-92).

Cost Comparison with conventional fuels

- The total cost for electricity production from wind power has often been an issue of scientific debate.
- In particular there are views that wind power is a technology that admittedly produces carbon free electricity but the total costs per KWh produced exceed the respective costs per KWh from conventional power plants (Dale et al 2004).
- The price of wind power per KWh is normally higher than the respective price for a modern conventional plant, when the generated cost for wind energy is calculated, that is installation, operation, maintenance and energy productivity costs as well as capital costs. These calculations depend heavily on the discount or interest rates applied in each case and these parameters are heavily dependent on national policies (SDC 2005).
- There is strong belief that in the future, large scale production and the impact of the 'learning curve' will decrease the generation costs of wind power (SDC 2005; EWEA 2003).
- Until today, calculations have not accounted for the external costs that are avoided with the use of wind power. The external costs produced from the use of fossil fuels for electricity are the ones that arise from the impact that fossil fuel burning has on the atmosphere and the greenhouse effect.
- It has been estimated that these costs for wind power are below 0.26 eurocents/KWh while for fossil fuels they range from 2 to 15 eurocents/KWh. It is obvious that an internalization of these costs in the above calculations would give a strong advantage of wind power against fossil fuel power.

Fixed Price and Fixed Quantity Support Systems

1. In the first category the most popular system is *the feed-in model*, where the operators are guaranteed a long-term minimum price for electricity obtained by wind power.

- This system has been politically criticised for being in conflict with traditional market principles.
- Countries that used the feed-in model such as Germany, Denmark and Spain had installed wind power capacities that were equal to the 84% of the EU's total (Szarka 2006;EWEA 2003).
- Other countries of the EU that apply the feed-in system are Austria, France, Greece, Luxemburg, the Netherlands and Portugal (Jacobsson & Lauber 2004; EWEA 2003; Meyer 2003).

2. In the second category of *fixed quantity systems* we meet examples based on governmental decisions regarding a certain "renewable quota". The governments decide on a certain quantity of renewable electricity to be established within a certain period, with the price of it being regulated by the market itself (EWEA 2003; Meyer 2003).

- A version of this system is the tender one, currently applied in Ireland. A quota is set for wind power production and the lowest bidder on supplying this quota is offered the contract.
- The UK, Belgium, Sweden and Italy are developing a Green Certificates System (GCS) as well as Denmark, which abandoned the feed-in model in 1999. According to the GCS, tradable certificates are issued for each renewable electricity unit produced in order to meet the agreed quota (Meyer 2003).
- Each developer receives a certain payment for electricity produced, which comes from the conventional electricity price plus the green certificate market price.
- This system introduces a market competition character to the production of green electricity as replacing the conventional supply methods (Ibid).

Breakdown of the studies' observed patterns

Table III: The contribution of each study to the analysis of the themes

Research/ author	Culture /education	Wind Potential	Central policies	Media	Local participation	NIMBY	Sustainability Relevance
Agterbosch (2007)	X	X	X	X	X		X
Alvares-Farizo&Hanley(2002)	X	X			X		X
Bell et al (2005)	X	X		X	X	X	X
Braunholtz (2003)					X		
BWEA (2005)	X			X		X	
Carlman (1988)	X		X				
Cavallaro & Ciraolo (2005)		X					X
Christensen &Lund (1998)	X	X	X	X	X		X
Devine-Wright (2005)	X		X		X	X	X
Devlin (2005)	X		X		X	X	X
Ek (2002)	X	X	X		X	X	X
Ek (2005)	X				X	X	X
Gamboa& Munda(2007)		X		X	X	X	X
Hagget &Toke (2006)			X	X	X	X	X
Houlihan (2002)					X	X	X
Jobert et al (2007)	X	X		X	X	X	
Kaldellis (2005)	X				X	X	X
Khan (2003)		X	X		X		X
Khan (2004)				X	X	X	X
Krohn &Damborg (1999)			X		X	X	X
Loring (2007)	X		X	X	X		X
McGowan &Sauter (2005)	X		X				
Michaelowa (2005)				X		X	
MORI (2004)	X	X					
Nadai (2007)			X		X		
Söderholm et al (2007)				X	X	X	
Strachan &Lal (2004)				X	X		X
Toke D. (2005)	X			X	X		X
Toke et al (2007)	X	X	X	X	X		
Urban (2004)					X	X	X
Van der Horst (2007)		X		X	X	X	X
Warren et al (2005)	X	X	X	X	X	X	X
Wolsink (2000)		X	X	X	X	X	X
Wolsink (2007a)					X	X	X
Wolsink (2007b)				X	X	X	X