



Universidade do Minho
Escola de Engenharia

Maria de Fátima Fernandes Malheiro Cunha Lima

Regional and Local Impacts of Wind Power Projects

Tese de Mestrado
Gestão Ambiental

Trabalho efectuado sob a orientação de
Professora Doutora Paula Varandas Ferreira
Professora Doutora Filipa Dionísio Vieira

Outubro 2012

Acknowledgments

First and foremost I would like to thank my two supervisors, Dr.^a Paula Varandas Ferreira and Dr.^a Filipa Dionísio Vieira, both from Minho University, for their constant availability, invaluable comments, criticism and constant encouragement throughout this project.

I am also thankful to all the interviewees for their availability, allowing to collect data and information.

A special word of appreciation towards my family, without your precious support none of this would be possible.

This work was financed by: the QREN – Operational Programme for Competitiveness Factors, the European Union – European Regional Development Fund and National Funds- Portuguese Foundation for Science and Technology, under Project FCOMP-01-0124-FEDER-011377 and Project Pest-OE/EME/UI0252/2011.

Abstract

Portugal has seen in recent years an increased growth of Renewable Energy Sources (RES), with a strong deployment of wind farms in its northern region, in accordance with national legal framework and current energy policies.

The majority of existing academic studies approaching impacts (benefits or costs) resulting from deployment of these technologies, mainly focus these aspects from a global point of view, assessing employment generation, reduction of massive external energy dependence or reduction of carbon dioxide emissions (CO₂). Nevertheless, RES projects have also been associated with significant impacts directly affecting local communities where they were implemented.

The current work's aim has been to identify such local impacts, reflecting the perspective of the local community through the use of interviews. A comparative analysis of the main impacts and the way they are being perceived by the local stakeholders, with other academic studies previously developed focusing this area of expertise was attempted.

The analysis of the results demonstrated that the majority of interviewees did not point out disadvantages that significantly altered their quality of life. Most of the research participants declared themselves in favor of this type of projects. The major importance of this sort of energy investments and of associated benefits was recognized. Revenues attributed to Communal Land Commission, in charge of managing the land destined to wind farm deployment, were perceived as highly favorable, allowing to answer local community's needs.

However, collected data also illustrated that this management has not always been a consensual process; positions have become more a part in questions like the reinvestment of obtained revenues in other local resources that will potentially affect future local sustainability. Notwithstanding, suggestions were made to overcome obstacles towards more sustainably diversified investments resulting from wind park revenues, namely resorting to external independent entities to promote dialogue among different stakeholders and accompany local communities during negotiation process.

Keywords: Communal Land Commission; wind energy; social impact; local sustainability.

Resumo

Em Portugal tem-se assistido ao crescimento acentuado das energias renováveis, existindo uma forte implantação de parques eólicos no norte do País, de acordo com a legislação e a política energética atualmente em vigor. A maior parte dos estudos existentes que abordam os impactes (positivos ou negativos) decorrentes da implementação destas tecnologias, focam sobretudo estes aspetos de um ponto de vista global, centrando-se em critérios como a criação de postos de trabalho, redução de dependência energética externa ou redução de emissões de dióxido de carbono (CO₂). No entanto, aos projetos de energias renováveis associam-se impactos significativos que afetam diretamente as comunidades locais onde são implementados.

O âmbito do presente trabalho é precisamente reconhecer estes impactes locais, refletindo a perspetiva da comunidade local através do recurso a entrevistas. Simultaneamente pretende-se apresentar uma análise comparativa dos principais impactes e a forma como estes estão a ser percecionados pelos *stakeholders* locais, com outros estudos previamente desenvolvidos focando a mesma temática.

A análise efetuada demonstra que, a maior parte dos entrevistados se manifestou a favor deste tipo de investimento, não identificando efeitos adversos que alterassem de forma significativa a sua qualidade de vida. É reconhecida a importância dos benefícios decorrentes da sua implementação, destacando-se nesse âmbito o papel das verbas atribuídas à Comissão dos Baldios que gere os terrenos comuns destinados à implementação dos parques eólicos, permitindo responder às necessidades da população local. No entanto, os resultados obtidos ilustram também que esta gestão nem sempre é consensual, registando-se posições antagónicas quanto ao reinvestimento das verbas atribuídas noutros recursos locais e que terão futuramente impactos a nível da sustentabilidade local. Não obstante, foram apresentadas sugestões, para ultrapassar os obstáculos existentes à diversificação sustentável dos investimentos provenientes dos parques eólicos, nomeadamente focando a intervenção de entidades externas e independentes que promovam o diálogo entre os diferentes *stakeholders* e acompanhem as comunidades locais durante o processo de negociação.

Palavras – Chave: Comissão de Baldios; energia eólica; impacto social; sustentabilidade local.

Table of Contents

Acknowledgements	iii
Abstract	iv
Resumo	v
Table of Contents	vi
List of Figures	viii
List of Tables	x
Abbreviation and Nomenclature	xi
1. Introduction	1
1.1 Scope	2
1.2 Main Objective and Methodology Approach	5
1.3 Organization of the Thesis	7
2. The Relevance of Wind Power in Energy Production	8
2.1 Introduction	9
2.2 The Relevance of Wind Power in Energy Production	11
2.3 RES and Sustainability	16
2.4 Review of Impacts from Production and Use of Wind Energy	19
2.4.1 Listing of Foremost Environmental and Human Effects	22
2.5 Concluding Remarks	50
3. Research Methodology	51
3.1 Introduction	52
3.2 Review of Research Methodology Concerning RES Projects	54
3.3 Social Research in RES Projects	60
3.3.1 Participatory Approach	61
3.3.2 Employment Generation	63
3.3.3 Other Benefits: Community Funds and Project Ownership	67
3.4 Selection of Appropriate Qualitative Methodology	70
3.4.1 Formulating Research Question	72
3.4.2 Establishing Overall Design	76
3.4.3 Field Work to Conclusion State	80
3.5 Concluding Remarks	83
4. Case Study	86
4.1 Background	87
4.2 Results	91
4.3 Discussion	99

5. Main Conclusions and Future Remarks	136
References	140
Annexes	148

Listing of Figures

Figure 1- Detailed evolution of wind energy's contribution to suppress national energy consumption in comparison with other available sources	3
Figure 2- Gross inland consumption by fuel, EU (27-2008)	11
Figure 3- Rate of energy dependency (%)	12
Figure 4- Relationship between 2020 objectives; RES contributions to final energy consumption and degree of accomplishment in EU	14
Figure 5- Aesthetic attenuation of visual impact with distance	22
Figure 6- Landscape and visual impact management	24
Figure 7- Noise emissions impact management scheme	27
Figure 8- Comparison of sound levels from operational wind turbine (at distance 250m) with other activities	28
Figure 9- Wildlife impact management scheme	31
Figure 10- Land occupation and usage impact management scheme	34
Figure 11- Water resource impact management scheme	36
Figure 12-- Shadow flickering effect management scheme	38
Figure 13- Electromagnetic interferences impact management scheme	40
Figure 14- Socioeconomic Impact management scheme	42
Figure 15- Air Quality and Carbon Footprint Impact management scheme	45
Figure 16- Comparative carbon footprint from different RES technologies	44
Figure 17- Architectural or Archeological Patrimony Impact management scheme	47
Figure 18- "Onion Research" Model	56
Figure 19- Crotty Research Stages Diagram	57

Figure 20- Initial Pre-established Qualitative Design	71
Figure 21- Qualitative Research Design	76
Figure 22- Quantitative and Qualitative measurement process	78
Figure 23- Interview Planning Scheme	80
Figure 24- Case Study location area	87
Figure 25- Recent evolution of cumulative generating capacity (MW) for wind energy	88
Figure 26- Main direct and indirect benefits attained by wind power deployment	92
Figure 27-Effect Diagram identifying potential incentives and barriers for RES Projects	96

Listing of Tables

Table 1- Contribution of RES to electricity production 2008 (TWh and %)	12
Table 2- Comparison of impacts from different energy sources	21
Table 3- Leading human-related causes for avian fatality in United States	30
Table 4- Comparison of land occupation required for energy production from different source	32
Table 5- Reduction of air pollution	43
Table 6-Dimensions of Social Research Methods	56
Table 7- Data Analysis	81
Checklist 1- Most mentioned impacts within categories of community benefits schemes	91
Checklist 2- Main referenced concerns with adverse impacts perceived by research participants	97

Abbreviation and Nomenclature

APREN- Portuguese Renewable Energy Association

CO₂- Carbon Dioxide

DGEG- Portuguese Directorate for Energy and Geology

ENE 2020- National Strategy for Energy 2020

EU- European Union

GHG- Greenhouse Gas Emissions

INE- National Statistics Institute

INEGI- Institute of Mechanical Engineering and Industrial Management

INESC Porto- Institute of Systems and Computer Engineering of Oporto

IPCC- Intergovernmental Panel on Climate Change

NO_x- Nitrogenous oxides

PNAER- National Plan of Action for Renewable Energies

REN- National Energy Network

RES- Renewable Energy Sources

SEAI- Sustainable Energy Authority of Ireland

SO_x- Sulphur oxides

VOC's- Volatile Organic Compounds

WBCSD- World Business Council for Sustainable Development

Chapter 1

Introduction

1.1 Scope

According to Aguiar and Santos (2007), within Project Climate Change: Mitigation Strategies In Portugal (MISP), climate change has been considered by far the biggest challenge faced by Human kind. It has also been acknowledged that, the observed global warming has an anthropogenic source, i.e. emissions resulting from human activities caused an increase in Greenhouse Gas emissions [GHG] (Intergovernmental Panel on Climate Change [IPCC], as cited by Saidur; Rahim; Islam and Solangi (2011) and Aguiar and Santos (2007)), potentially jeopardizing ecosystem's integrity. Richards, Noble and Belcher (2012) stated that this same panel, IPCC, suggested a substantial reduction in such emissions, estimating most reductions (60-80%) would be accomplished in "energy and industrial processes" (p.691) where the increasing usage of RES played a strategic role. Ever since, there has been an increased tendency towards investment in RES at global level (Richards et al., 2012); being wind power considered by Szarka (as cited by Munday; Bristow and Cowell, 2011) as a "dominant feature of renewable energy expansion in European countries" (p.1). Due to being regarded as the most inexpensive option for "large scale" RES deployment, onshore wind energy, has already provided a "significant amount" of energy to both residential and industrial areas (RenewableUK, 2011:2), contributing to such preeminence in current energy sector. In national context although 2011 has registered the greatest decrease in energy consumption, renewable energy production has been responsible for 46% of that consumption; from which 9,0 TWh have resulted from wind power, being responsible for supplying 18% of energy consumption (National Energy Network [REN], 2011). Figure 1 represents the recent evolution of energy consumption in Portugal, according to its source, differentiating the contribution of wind energy within renewable energy production.

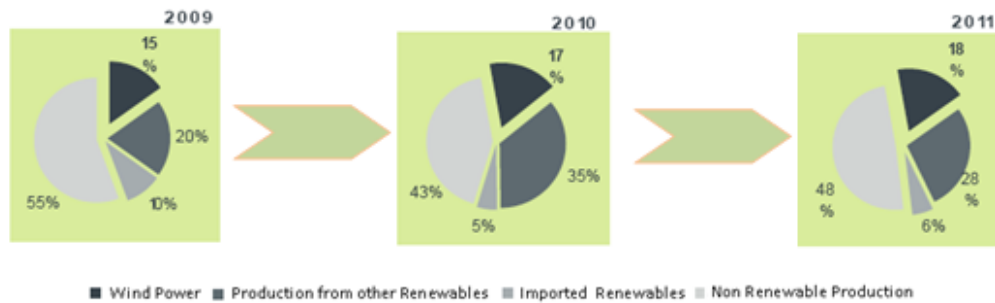


Figure 1- Detailed evolution of wind energy’s contribution to suppress national energy consumption in comparison with other available sources (source: REN, 2011).

Resorting to wind energy has also converged with European strategic approach to energy policy, the 2020 Strategy, leading the national government to defining the overall course of action for the energy sector, taking into consideration concerns with economical and environmental aspects (namely energy security and climate change).

In a clear attempt to switch to a greener economic scenario, where “improved human well-being and social equity, while significantly reducing environmental risks and ecological scarcities” (UNEP as cited by Endl and Sedlacko, 2012:5) is favored.

The changes promoted by this shift have had reflexes not only at a national level, but as well as at a more localized scale; denoting a strong connection between energy and all three pillars of sustainability – environmental, economical and social dimensions. The more straightforward links have been economical and environmental dimensions, since as previously stated by Ferreira, (2007), energy has been considered vital for economic growth, having “direct impact” on company’s “economic performance”, as well a “strong impact on the environment” leading to the inevitable incorporation of environmental issues in energy policy (Portuguese Directorate for Energy and Geology [DGEG], 2012c). A less focused but equally important aspect of energy sector, especially considering RES deployment, is the relationship between energy and social welfare. Overall energy has been considered a “driving force” for social wellbeing (Ferreira, 2007:3), and particularly RES projects have brought important changes to local communities. However, a thorough research of effects on local development, more specifically of generated benefits directly or

indirectly favoring hosting communities has been scarce (see Munday et al., 2011; Del Rio and Burguillo, 2009b; Rogers; Simmons; Convery and Weatherall, 2008). Likewise studies concerning elements considered essential to develop “successful community benefit schemes”(Sustainable Energy Authority of Ireland [SEAI], 2011h:62), such as public perceptions and expectations regarding RES deployment have also been lacking (see Rogers et al., 2008); contributing to despite potential important contribution to local sustainability (see Del Rio and Burguillo, 2009b) these projects either kept “facing strong social opposition” (see Ferreira, 2007:3) or needing to answer people’s expectations of “greater involvement” in RES projects (see Rogers et al., 2008:4217). Making the approach to this theme, resorting to qualitative methods to assess local community’s insight vital to achieve a positive outcome, reflecting both focal stakeholders concerns as well promoters needs, ensuring and increasing the possibilities of attaining a “sustainable and inclusive growth”(EC as cited in Endl and Sedlacko, 2012:6).

1.2 Main Objectives and Methodology Approach

The proposed work aims to address the local and regional social impact of RES projects, focusing on developing a methodology to assess them from a stakeholder's perspective, applying it to a Municipality or Village case study. Public insight has been gathered through qualitative methodology, since it enables to better capture its changing character, influenced by several variables including "geographical; temporal; socio-political or cultural contexts" (see Aitken, 2010a:1835). A theoretical framework was developed helping to define several steps of a dynamic nature that ultimately lead to interviews with different local stakeholders. The outlining of a theoretical approach for this thesis was considered vital, since it has provided a basis of concepts and assumptions that sustained research plan (see Neuman, 2003). Allowing the researcher to develop a "train of thought", i.e. having a logical perception of obtained data subsequently "identifying patterns" as well as "chance occurrences from significant observations" (Rubin and Babbie, 1997:56), enabling the researcher to pursue them throughout the course of the interview; effectively influencing the way he or she apprehends the subject matter (see Neuman, 2003). The adoption of such strategy has facilitated the accomplishment of abovementioned aims, i.e. demonstrating the major impacts perceived by the stakeholders and the benefits or social costs ascribed to RES projects.

1.3 Organization of the Thesis

This work was developed according to previously established objectives, being organized as the following sections:

The first section gives a global insight of the structure and content of the current work. The second section constitutes a brief contextualization of the relevance of wind energy's contribution in the current global energy scenario, with particular attention being given to the recent evolution to national energy context, and policy background. Also exploring the connection between the concept of sustainable development and Renewable Energy Sources (RES) and the way, to effectively ensure in practical terms, that RES deployment has an integrated approach, featuring all three dimensions of sustainability. Within chapter 2 an overview of the major impacts associated to wind farms is also provided, despite comparatively to conventional energy sources being considered a cleaner alternative, it is not devoid of side effects requiring accurate assessment in order to attain a sustainably managed process. The third chapter focuses research methodologies, offering a background literary review of research methodologies concerning RES projects, considered essential to contextualize and acquire different insights about theoretical frameworks regarding wind energy deployment analysis, referencing several previous studies. In this chapter (3.3), the main aspects of social research are also focused and exemplified mostly resorting to scientific journals; section 3.4 also aims to define this work's qualitative methodology approach, allowing to establish prior to fieldwork itself a dynamic process that by delineating a logical sequence allowed to capture focal stakeholder's attitudes resorting to semi-structured in-depth interviews. This qualitative technique has been considered the best option to portray with considerable detail and accuracy social impacts from a stakeholder's perspective.

Chapter 4, features the application of previously defined qualitative methodology to a specific case-study along with a brief characterization of the case study area is given. In this section 4.2, main obtained results are also exposed, aiming to shed some light on them, an analysis and discussion is undertaken (section 4.3); leading to conclusions and future recommendations (section 5) on how to improve and evolve to a more sustainable process with

greater involvement of local communities, and benefits that effectively make meaningful contribution to local communities in a long –term perspective.

Chapter 2

The Relevance of Wind Power in Energy Production

2.1 Introduction

Socio-economic, political and environmental aspects, have been currently driving countries to approach energy supply from a more sustainable perspective; implying looking to RES (Renewable Energy Sources) with “increasing attention” as potential alternatives to more conventional energy sources (see Richards; Noble; Belcher, 2012:691). Such is the case of the increasing incorporation of wind energy in national “energy mix”. This new approach is expected to tackle issues of security of supply while reducing emissions that aggravate climate change, and increasing competitiveness (see DGEG, 2012 and European Union, 2011b). This shift towards a greener economy, has been supported by the development of European policies, and National policies, such as the National Strategy for Energy -ENE 2020.

The adoption of such strategy towards growth, would contribute to promote and provide tools facilitating the achievement of sustainable development at local level. Despite the vastness and complexity of its definition, encompassing three dimensions (social, economic, and environmental), the increasing usage of integrated assessment could make a significant difference in wind farm’s deployment and effective contribution to local sustainability.

Effectively, the increased awareness and evidence of conventional energy sources impacts on the environment, stimulates the investment in alternative ways to meet energy supply in a more sustainable manner. Despite the contribution of RES to achieve this purpose, their impacts cannot be ignored (see Leung and Yuan, 2012; Saidur et al.,2011 and Katsaprakakis,2012) . Overall although wind energy has been considered a cleaner energy source, helping to reduce greenhouse gas emissions (GHG) and therefore contributing to placate global warming, its most mentioned impacts have been related to landscape and visual impact; noise emissions; wildlife and biodiversity; land use and occupation; socioeconomic standards and electromagnetic interference or shadow flickering effects. Accurate impact assessment is essential to coordinate these different aspects of environmental, economic or social nature, integrating them into a more sustainably managed planning process.

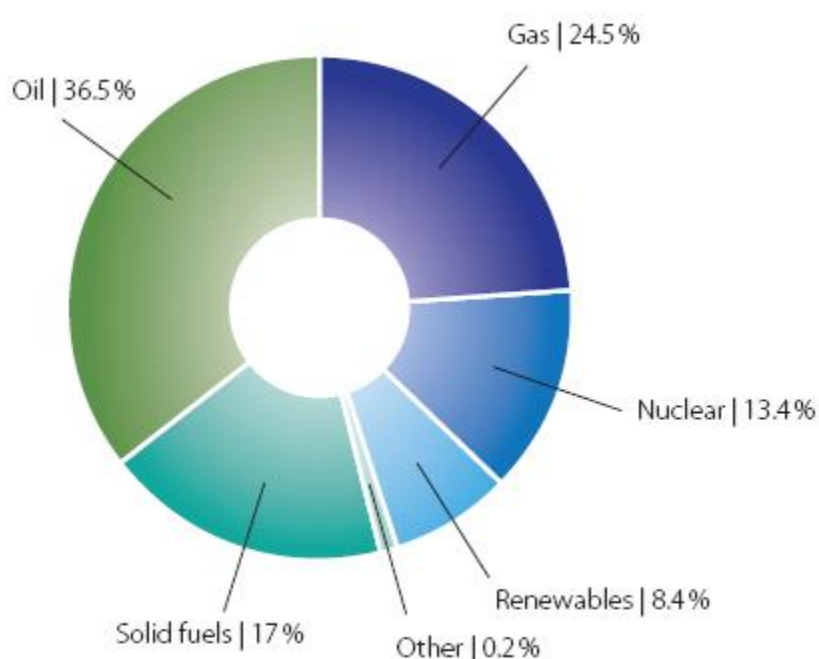
In order to achieve a balanced energy service, many efforts need to be developed in several areas (from policy support, throughout different project

stages: planning; construction; operation and decommissioning) involving guidelines and good practices, always promoting stakeholders engagement, ensuring local community acceptance. Giving a step forward towards “the development that meets the needs of the present, without compromising the ability of future generations to meet their own needs” (Brundtland as cited in Del Rio and Burguillo, 2008a:1327).

2.2 The Relevance of Wind Power in Energy Production

Europe is facing nowadays one of the greatest challenges concerning energy sector; the continuous rise of energy prices along with a high level of dependency on “energy imports” jeopardizes countries “security and competitiveness” (European Union, 2011a).

Currently and according European Union (2011b:5) (EU) overall countries have been “highly and increasingly dependent on imports of fossil fuels (particularly oil and gas)”, relying on them for 79% of their “gross inland energy consumption” (see figure 2).



Source: Eurostat.

Figure 2- Gross inland consumption by fuel, EU (27-2008). (Source: Eurostat as cited in European Union , 2011b).

Most of this energy consumption has been used to suppress the needs for transportation and electricity generation. The use of RES has been seen as an effective way to tackle this problem, reconverting energy supply system while addressing environmental, economic and social issues. This has been very patent in electricity supply (see Table 1), where RES and particularly wind energy have been currently contributing to generate an available greener and ever more competitive electricity system (see European Union, 2011b).

Table 1- Contribution of RES to electricity production 2008 (TWh and %) (Source: Eurostat as cited in European Union, 2011b).

■ Wind	20.9%
■ Solar (photovoltaic thermal)	1.3%
■ Biomass	19%
■ Hydro	57.7%
■ Geothermal	1%
Total electricity generation EU-27	3374 TWh
Total renewable energy sources	567 TWh
Share of renewable energy sources	16.8%

Source: Eurostat.

Table 1 demonstrated the relevance that wind energy has had on reconverting the energy production sector; Wind has been considered one the foremost promising technologies, with great developments that increased its consistency in terms of energy generation (see European Union, 2011b).

Similarly to the European scenario, Portugal's energy scenario has been characterized by considerable dependence on external energy resources, mainly due to energy system's reliance on fossil fuel derivatives (oil; natural gas and coal) (see DGEG, 2012b). Figure 3 presents the values of national energy dependency.

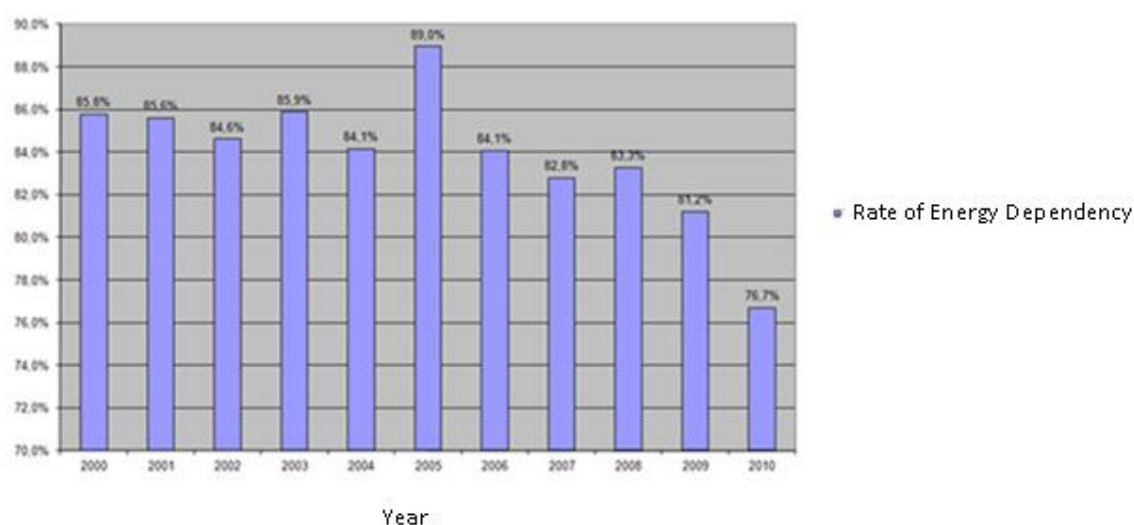


Figure 3- Rate of energy dependency (%). (Source: DGEG, 2012b).

These results show that despite statistical evidence pointing to a significant energy dependency on energy importations (76,7% in 2010), last three years present a decreasing trend (see figure 3). This decreasing trend results from the increasing reliance on RES. This evidence has been further underlined by Institute of Mechanical Engineering and Industrial Management (INEGI) and Portuguese Renewable Energy Association (APREN) (2011) study, stating that over the last decade, RES has taken an important role in “national energy mix”, particularly with the “increasing number of wind farms” located in national territory. This assessment has emphasized the “fundamental role RES played for the reduction of the external energy dependency, actively contributing to increasing the security of supply” (see Ferreira, 2007:17). Nonetheless, according to the cited author, despite structural changes foreseen in this sector, clearly favoring RES, the hydro component is still dominant for electricity production, although closely followed by wind energy.

This effort has been accomplished by resorting to National policies that “promote energy security, competitiveness, GHG mitigation and adaptation to climate impact” (see World Business Council for Sustainable Development [WBCSD], 2012:1), such is the case of the National Strategy for Energy -ENE 2020. This strategic approach was initially defined at an European level, with the establishment of targets to accomplish at the year 2020. Each Government became then engaged, on establishing their own instruments and strategies to achieve the main goals (see Comissão para as Alterações Climáticas, 2002). The Portuguese strategy (goals) regarding for RES, were defined in 2010 in the National Plan of Action for Renewable Energies (PNAER) (Ministério da Economia Inovação e Desenvolvimento, 2010). In this context, national authorities pledged to reduce this external dependency, by meeting 20% of our energy needs from renewable sources; increasing energy efficiency, contributing to reduce by 20% energy consumption; and reducing greenhouse gas emissions by 20%, especially CO₂, through the development of “main strategic guidelines for the energy sector” (see DGEG, 2012a and Ministério da Economia Inovação e Desenvolvimento, 2010). National Government has recently defined a more ambitious goal, aiming towards a reduction of 25% in primary energy consumption till 2020 (INESC Porto and AT Kearny, 2012).

This strategy was approved into legal framework, by legal resolution n° 29/2010. As a result of national policies promoting RES, Portugal presents nowadays one of the best track records regarding RES use towards 2020 final energy consumption targets (INESC Porto and AT Kearny, 2012). Which has allowed a top leading place within European Union (EU-27) in terms of incorporating RES in energy production (APREN, 2012); making the national global target of 31% the fifth most ambitious in European context (INESC Porto and AT Kearny, 2012). As figure 4 shows in 2009 Portugal had already achieved 79% of targets established for 2020, with 25% RES production contributing to national energy consumption.

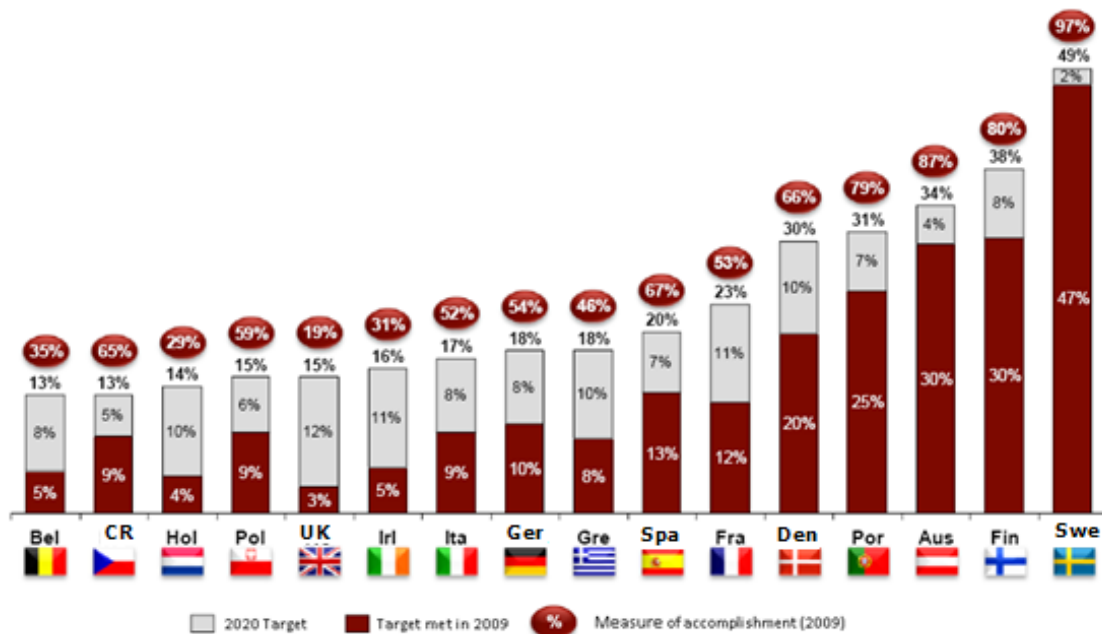


Figure 4- Relationship between 2020 objectives; RES contributions to final energy consumption and degree of accomplishment in EU. (Source: Eurostat as cited in INESC Porto and AT Kearny, 2012).

In 2010, for the main axis of energy sector, RES use reached the following results: heat and cold supply registered 35,1% provided from renewable sources when the initial objective was set at 30,6%; electricity supply 41,1% versus an objective of 55,3% and 5,6% in transportation for an initial target of 10,0% (INESC Porto and AT Kearny, 2012). RES represented 24,7% of final gross energy consumption in contrast with a 31% objective (INESC Porto and AT Kearny, 2012), notwithstanding this result has been considered by Eurostat as being above EU average (12,4%) (APREN, 2012).

Despite this positive outcome, current national and international economic frame inevitably entail a reflection of impacts upon the future of energy sector and the achievement of objectives established at an European level by 2009/28/CE (INESC Porto and AT Kearny, 2012), and subscribed by national Government. According to APREN (2012), the approval of legal resolution nº 25/2012, suspending the attribution of power in public electrical grid has seriously affected the development of electricity production from RES. According to the same source, the most recent version of PNAER would imply a reduction of 23% in terms of wind power deployment; putting at stake the achievement of goals concerning energy production from RES. The current situation of social and financial constrains would imply resource rationalization, stimulating the need to establish priorities, and clarify main guidelines of action in a sector considered strategic for national competitiveness (INESC Porto and AT Kearny, 2012). Especially since, the application of such policy stopping abruptly the development of RES projects, would go against the economic, environmental and social concerns of the country, as well as international pledges undertaken (APREN, 2012).

2.3 RES and Sustainability

Energy supply has been considered a critical aspect of modern life, playing a center role in the economic scenario of most countries, becoming a prime driver for productivity (see WBCSD, 2012); contributing to improve social welfare (see Ferreira, 2007) and global development. Therefore it should be considered as a crucial issue to attain sustainable development (see Ferreira, 2007), since as the previous statement showed, it has connections to all three pillars of sustainable development: environmental; social or economic.

Despite this being a multi-dimensional subject, where scientific consensus has not been easily achieved as other aspects with more substantial “levels of knowledge” (see Ribeiro et al., 2011:4362), many steps forward have been given, resorting to policies and planning instruments, in order to ensure social dimension is more effectively considered regarding RES deployment. For instance, developing guidelines and promoting best practice to incorporate a thorough “Socio-Economic Assessment (SEIA)” during “Environmental Impact Assessment (EIA) process” (see Sustainable Energy Authority of Ireland [SEAI], 2011a:68). Another reflex of this holistic perspective of development has been given by Allen; Sheat and Chavez-Diaz, (2012):264 case study sustaining that in order to achieve a “sustainable future”, “Sustainability Appraisal (SA) and Strategic Environmental Assessment (SEA)” should be ensured. These tools have allowed to scrutinize all alternate “course of action” identifying “the actions that maximize sustainability” potentiating “positive outcomes” while reducing adverse impacts (see Partidario et al., as cited in Allen et al., 2012:264).

These examples reflect two very important aspects concerning the interaction between RES and sustainable development, allowing implementing an integrated approach, encompassing all three dimensions. The first one being the dependence on innovative planning tools that has allowed communities and authorities to take full advantage of “potential sustainable synergies”(see Porritt as cited in Allen et al., 2012:264); the second is the institutional aspect, that should always be associated to sustainable development’s dimensions in terms of implantation, aiming at the way institutions have been managed and legal framework, as well as participation of stakeholders and general population (see DGEG, 2012c). Concerning this issue, several “policies and actions” have been

implemented, promoting “energy security, competitiveness, GHG mitigation and adaptation to climate impact” to ensure a “future low-carbon economy”(see WBCSD, 2012:1). Furthermore this author has considered “these framework conditions” vital to determine how future investments in energy sector will be made, and associated consequences, for instance regarding “GHG trajectories”.

The Portuguese Directorate for Energy and Geology (DGEG) (2012c) stated that given the nature of activities associated to energy sector, implying severe impacts on the environment, namely “climate change”, the elaboration of policies for these aspects requires “a two-sided consultation process; meeting existing synergies and taking into consideration impacts”.

An integrated strategic approach should be taken, regarding “energy and environmental policies” taking into consideration “cost-effectiveness” as well as socio-economic development while encouraging sustainable development, “bearing in mind energy security and competitiveness” (see DGEG, 2012c).

The previously cited author, pointed out several efforts have been developed with the purpose of further integrating environmental aspects in energy policy, with special emphasis to the National Energy Strategy (ENE, 2020). This document delineated several measures considering both short –term and long – term approaches. For instance, in a more immediate time frame, sustainability will be attained through the promotion and increase of “energy efficiency” and resorting to “best available technologies”; on a longer time frame, priority will be given to “development of new technologies”. Participatory approach should also be undertaken, “inducing behavioral changes” while stimulating “citizens to be involved in decision making process; “resource management and projects developed in this area” (see DGEG, 2012c).

In order to reduce Portugal’s external energy dependence, while increasing energy efficiency and reducing CO₂ emissions, national government has developed strategic guidelines for energy sector stimulating the contribution of RES, focusing among others on wind energy (INESC Porto and AT Kearny, 2012). The investment in such option has revealed a positive outcome, since wind energy currently represents a key aspect in national energy context, with increasing deployment throughout national territory (INEGI and APREN, 2011). This fast dissemination has been associated to the fact that wind power is

considered a viable opportunity, from both a technological and economic perspective. Making the study of potential impacts associated to its deployment vital in order to further improve this technology, as well as attaining a sustainable management.

2.4 Review of Impacts from Production and Use of Wind Energy

Within RES, wind energy presented itself as strong contender to fulfilling a major role as an energy source with global potential appeal. Leung and Yuan (2012) have underlined that, considering all current RES alternatives, wind energy is at this stage, the only one that provides both a well established technique and “promising commercial prospects” (p.1032), being applied at a global scale in energy generation. This is a stipulation *sine qua non*, considering energy supply to a growing economy, while simultaneously attending an increased concern relating environmental issues. Unlike other conventional energy sources that face exhaustion, wind power is considered a green technology mainly because it is not associated with emission of pollutants that contribute to adverse impacts on the environment (see Leung and Yuan, 2012 and Saidur et al, 2011).

Although overall wind parks have been considered environmentally friendly, they are still associated with localized impacts (Katsaprakakis, 2012), which potential effects on an enduring timeframe cannot be despised, but are currently being discussed (see Leung and Yuan, 2012).

According to several authors (see Katsaprakakis, 2012; Leung and Yuan, (2012); Saidur et al., 2011) and Sustainable Energy Authority of Ireland (SEAI), 2011) most relevant impacts (either of a positive or negative nature), have been related to specific environmental parameters namely: landscape; ecology (wildlife and biodiversity); noise emission; electromagnetic interferences; shadow flicker effect; land usage and occupation; climate change and socio-economic impacts (community benefit schemes).

The abovementioned impacts have been object of main concern (especially in local communities) because most of these effects will endure throughout the lifetime period of the project; furthermore the activities that instigate them occur during several phases of the development (from planning to deactivation phase) (Mendes; Costa and Pedreira, 2002).

Since deployment of such projects often depends on perceptions of local stakeholders, to achieve public consent it is imperative to develop an Environmental Impact Assessment (EIA) (see SEAI, 2011a).

EIA is a tool that is required by law, and that has had an important role in the progression of wind projects in Portugal. Allowing to focus and assure that all major potential effects identified are being taken into consideration from the earliest stage of its development, as well as the assessment of their expected significance (see Miranda, 2007 and SEAI 2011a).

Contrary to common knowledge, EIA is not restricted to environmental issues, mainly because the concept of environment has evolved to incorporate human interaction, Chadwick (as cited in SEAI,2011a:68), states that this reflects “a wider definition of the environment, encompassing its human (i.e. social, economic and cultural) dimensions”. Therefore UNEP and Glasson (as cited in SEAI, 2011a:68), considered that because of the intricate connection between social and environmental spheres, it is crucial the identification, forecast and assessment of social impacts together with other “biophysical aspects”.

Saidur et al., (2011) pointed out the importance of having accurate information concerning impacts previous to project deployment, data facilitation is also considered essential to providing theoretical comprehension of wind energy projects(Mendes et al., 2002). Most authors (see Leung and Yuan, 2012; Katsaprakakis, 2012)seem to agree that the scale of potential impacts is minor, especially when compared with more conventional energy sources(see table 2), but with adequate policies and planning, along with impact knowledge can make a contribution towards a successful management. Negative impacts can be mitigated by resorting to optimization techniques whether of the equipment itself (see Saidur et al., 2011) or location of the wind farm (see Katsaprakakis, 2012).

Table 2-Comparison of impacts from different energy sources (Source: Katsaprakakis, 2012):

Energy Source	Production Technology	Gas Emissions	Other environmental impacts
Coal; Oil; Natural gas	Thermal Power Plants	CO ₂ ; NO _x ; SO _x ;VOC, ash	Exhaustion of reserves, pollution during transportation
Nuclear Power	Nuclear Power Reactors	-	Nuclear waste; nuclear weapons; nuclear accidents
Biomass	Thermal Power Plants	CO ₂ ;SO _x ;VOC;cinder	Reduction of agricultural production
Hydro Power	Hydroelectric Power Plants	-	Impact on sensitive biotopes; dangers from collapse of dams
Wind Power	Wind Parks	-	Visual impacts; noise emissions; impacts on birds; shadow flicker;land use; electromagnetic interference
Solar Power	Photovoltaic Parks	-	Land use; visual impact.

Mendes et al., (2002) underlined the importance of preliminary impact analysis for determining an ideal location for wind farms, therefore promoting an optimization with the surrounding environment. More recent work show that although some aspects have been improved by undertaking EIA process, there hasn't been a realistic perception of that upgrade, since environmental related issues are often considered secondary by developers (see Miranda, 2007).

As a result of this overall literature survey the following detailed overview of the most pertinent environmental and human effects of wind farms was undertaken:

- Landscape and visual impact;
- Noise emission impact;
- Wildlife impact;
- Land occupation and usage impact;
- Shadow flicker effect;
- Electromagnetic interferences;
- Socio-economic impacts (community fund schemes);
- Water resources impact;
- Air quality and Carbon footprint.

2.4.1 Listing of foremost Environmental and Human Effects

Landscape & Visual Impact

By introducing equipment and installations in rural areas, “where most of the best wind sites are found”(Varun et al. and Kikuchi as cited in Saidur et al., 2011:2424), altering a natural scenario influences unquestionably the surrounding landscape (Katsaprakakis, 2012). According to Katsaprakakis (2012), this has been considered quite a subjective issue, dependent of community acceptance, nonetheless in order to achieve visual acceptance several key issues have been recognized:

- Wind farm’s siting and design have an effect on scenic characteristics(see SEAI, 2011b);
- Occupation/vicinity of natural sites of cultural, historical or social interest often implies negative reactions (see Katsaprakakis, 2012 and SEAI, 2011b);
- Altering the availability and significance of residential, recreational areas (see SEAI, 2011b). According to Saidur et al. (2011), visual impact diminishes, as the distance to the residential areas rises, being gradually attenuated at distances over 5 km (Katsaprakakis, 2012) (see figure 5).

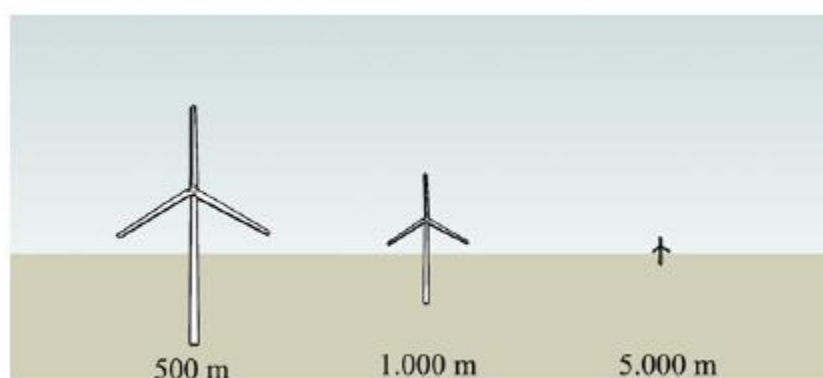


Figure 5- Aesthetic attenuation of visual impact with distance. (Source: Katsaprakakis, 2012).

- Equipment characteristics (turbine’s color and size), have been mentioned as one of the aspects that influences visual impact outcome. Coloring of wind equipment has been taken into consideration to promote visual integration with its surroundings (green colors on base gradually changing to lighter colors on top to blend with sky (see Katsaprakakis,

2012 and Saidur et al., 2011). The number of blades and turbine's size is also taken into consideration, Katsaprakakis (2012) stated that the ideal number of blades to obtain a visually appealing image is three; regarding the height of the tower, SEAI (2011b) highlighted that the difference in sizes is not easily perceived for most viewers.

- Movement of wind turbines, has been viewed by some authors (see Katsaprakakis, 2012 and Saidur et al., 2011) as being relevant for the project's acceptance, because stillness implies a sense of damage to the landscape; Jaskelivicius and Uzpelkiene (as cited in Saidur et al., 2011) also stated that operational blades, are more difficult to see and therefore cause less negative visual impact.

The nature of exposed issues clearly demonstrates the complexity of the theme. In order to minimize and reduce visual impacts, simultaneously promoting improvements and shifting local community's view towards acceptance, it is necessary to adopt good practice guidelines (see figure 6). Wind Farms and Landscape Values (WFLV) as cited in SEAI(2011b), predicted that resorting to different design, location and management strategies, it has been possible to mitigate negative impacts, while emphasizing the positive features of these projects.

As inevitable impacts that tend to condition the project's approval, it has been increasingly considered a crucial factor involving local communities for a successful approach to manage and mitigate visual impact (see SEAI, 2011b).

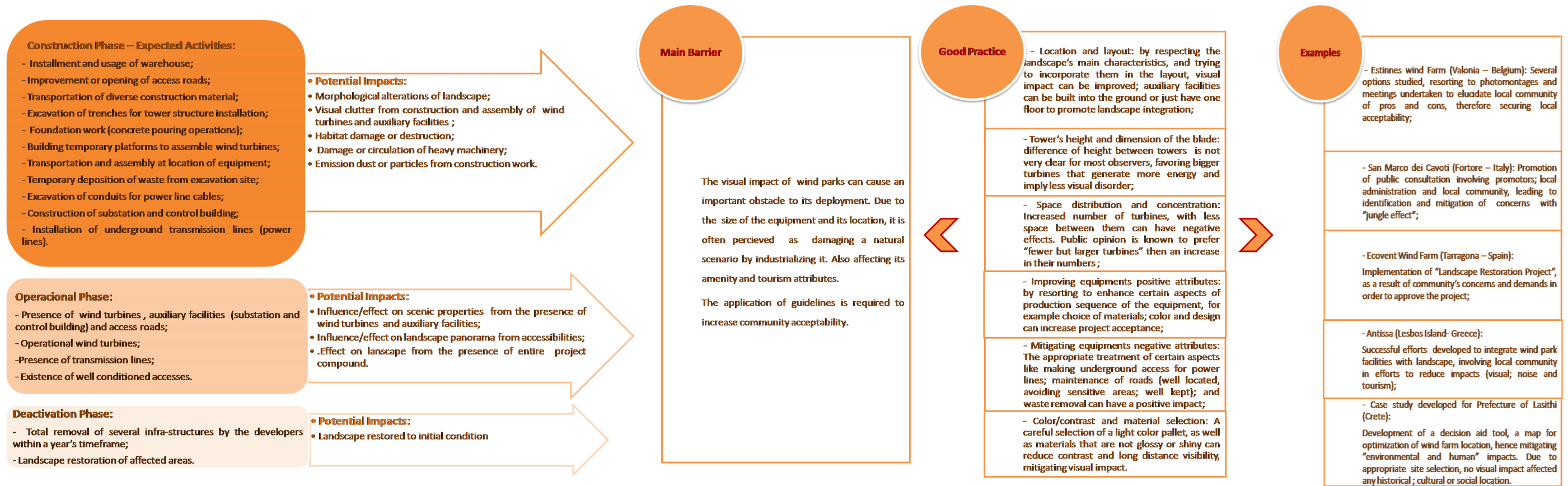


Figure 6- Landscape and visual impact management scheme (Own elaboration; Sources: Mendes et al., 2002; SEAI, 2011b and Katsaprakakis, 2012).

Noise Emission Impacts

One of the most mentioned effects associated to wind farms has been noise emission, although the acknowledgment of noise pollution as a source of problems affecting public health and quality of life standards is relatively recent. As a source of environmental noise with potential adverse effects, especially during construction and operational phases turns essential to make an assessment in order to prevent or mitigate such consequences.

In order to evaluate the significance of these impacts and identify different ways to tackle the problem, several key issues have been recognized as influencing factors in the outcome of noise emissions. SEAI, (2011c), Leung et al., (2012); Katsaprakakis (2012); Saidur et al., (2011) and Mendes et al., (2002) have highlighted the dependency on location of the compound and distance from residential areas. Regarding this issue, besides the possibility of decreasing property value nearby construction site (Saidur et al., 2011), Pedersen (as cited in Leung et al., 2012) has studied the link between noise emissions and welfare, further concluding that annoyance by the presence of wind farms reflected in stress and headache symptoms. However, according to Katsaprakakis (2012), most of the infrastructure is located in inhospitable areas (usually along the ridge of a hill) where potential for energy production is increased. Other elements seem to have played an important role regarding noise issues, namely the proximity of other human activities; characteristics of the equipment used; type of location (e.g. rural or inner-city) and linked to the nature of the area, background noise (see SEAI , 2011c).

During the abovementioned phases, the increase in noise levels is a result of different activities presenting diverse characteristics. For instance, during construction work it has been estimated an increase in both continuous and punctual levels in immediately surrounding areas to wind park facilities, as well as along access roads. These effects are an outcome of procedures involving heavy machinery, namely excavations or equipment transportation (Mendes et al., 2002). Noise emissions during construction phase are often considered temporary (SEAI, 2011c),

ceasing once work is completed. Operational phase implies noise levels of a different scale, emitted by wind turbines operation. Here noise can be typified in two categories, originating from different components (see Katsaprakakis, (2012); Saidur et al. (2011) and (Mendes et al., 2002). :

- Mechanical noise (associated to gearbox; electric generator and bearings);
- Aerodynamic noise (resulting from interaction of blades and wind).

Nowadays due to significant advances in engineering wind turbines, mechanical noise has been no longer considered a main concern. According to DWTMA as cited in Mendes et al., 2002), in the last few years equipment builders managed to reduce noise levels in half by adopting new design techniques. SEAI (2011c) also mentioned that another aspect to take into consideration while analyzing this subject is the substitution of earlier models with more modern, and improved wind turbines.

The other source of noise generation, the aerodynamic type, has been recently “related to sleep disturbance and hearing loss” (Punch et al., as cited in Leung and Yuan, 2012:1037).

However, overall there seems to be indications that people susceptible to low frequency of aerodynamic noise may also be affected by other sources such as air –conditioning devices (SEAI, 2011c). In fact, both cited authors claimed there is still currently a lack of substantiation regarding direct cause-effect of adverse impacts from this noise exposure on public health.

Nonetheless it has been considered by some author’s (see Leung and Yuan, 2012) as a critical factor to assess in terms of wind power impacts. Visual proximity to infrastructure has been pointed out as amplifying “noise annoyance” (see Katsaprakakis, 2012 and Pedersen; Berg; Bakker and Bouma, 2009). Regarding this issue, Pedersen et al. (2009) revealed an interaction between economic benefits and noise perception. According to this author, community funds can actively decrease irritation in spite of noise pollution, if it implies profit.

Besides the “whooshing sound” effect Saidur et al., (2011) considered particularly meaningful the interaction between wind direction and noise propagation. It has been said that noise intensity in-between the turbine and reception point, could be increased depending on wind direction (Long as cited in Saidur et al., 2011). In order to understand the dimension of the problem figure 8 contextualizes sound levels from operational wind turbines, with other activities. At a distance of 250 m emissions are inferior to 50 dB, being considerably less imposing then other activities from everyday life (Mendes et al., 2002). More recently, SEAI (2011c) stated, it has been reported a drop in pressure levels (from 50-60 dB to 35-45dB) at a distance of 350m. Since in several European countries noise levels limits in residential areas are set within 45 to 40 dB (Katsaprakakis, 2012), this parameter should be respected in order to prevent exposure to endangering noise levels.

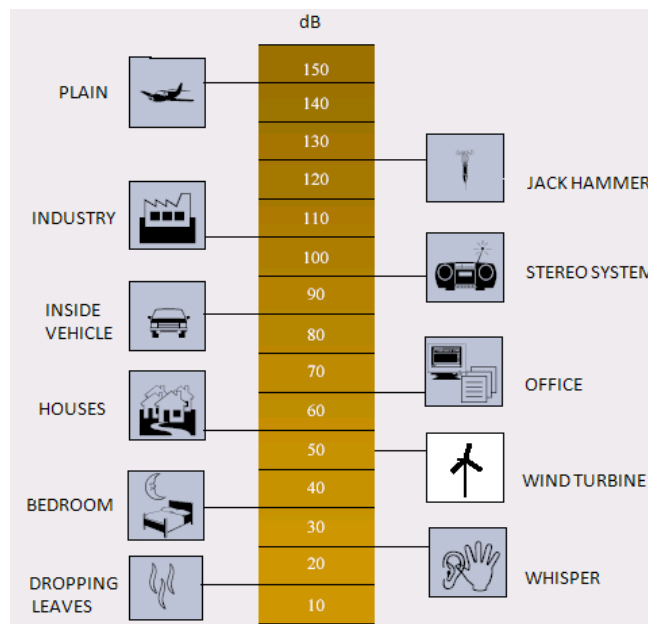


Figure 7 – Comparison of sound levels from operational wind turbine (at distance 250m) with other activities (Adapted from: AWEA as cited in Mendes, et al., 2002)

A impact management scheme was developed (see figure 8) in order to expose guidelines to effectively reduce identified noise emissions throughout three main phases of implementation of wind farms; contributing to ameliorate expected impacts avoiding less appropriate practices that might shift local community’s perception, retracting them from RES projects.

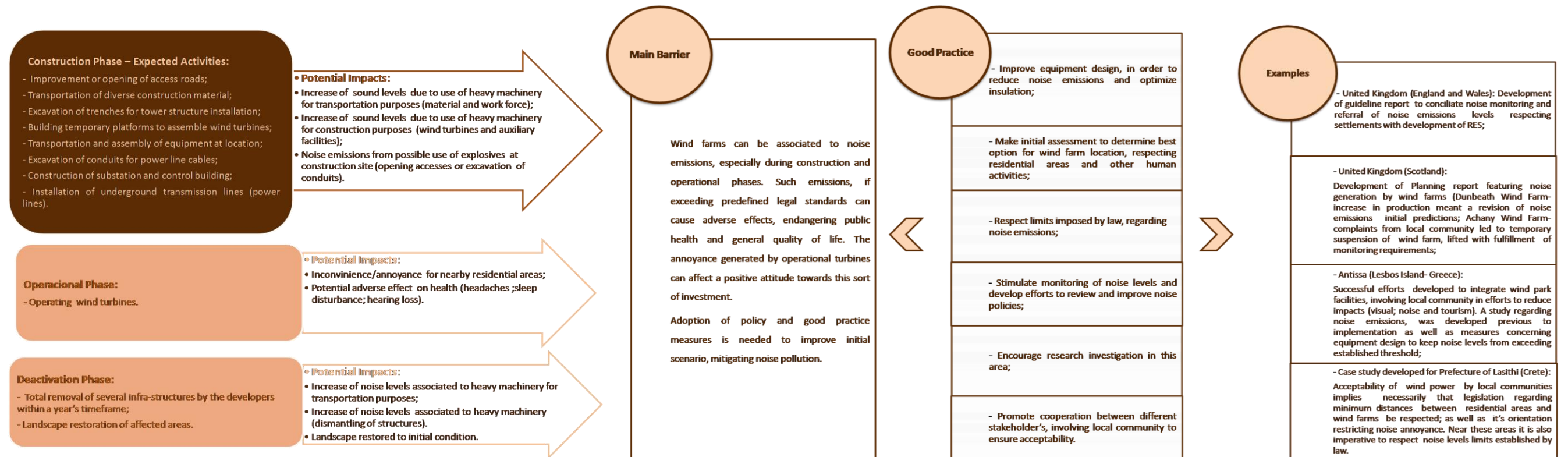


Figure 8- Noise emissions impact management scheme. (Own elaboration, Sources: Mendes et al., 2002; SEAI, 2011c and Katsaprakakis, 2012).

Wildlife Impact

One of the aspects that most stakeholders take into consideration, influencing decision-making process towards acceptability has been adverse impacts on wildlife biotopes. Edification in sensitive areas (whether focusing on flora or fauna), tend to potentiate impacts on wildlife and biodiversity. These effects can occur during construction and operational phases, affecting them directly or indirectly (see Saidur et al., 2011 and SEAI, 2011d).

Although according to Mendes et al., (2002) and SEAI (2011d), the nature of the impact is highly dependent on the characteristics of the location site, project's attributes, the type of species involved and their patterns (such as migration routes, feeding habits or reproduction sites).

Regarding direct impacts, collision risk has been considered the most noticeable, affecting significantly certain rare species (eagles, vultures and bats for example), although till a certain extent, also influenced by weather and visibility factors (see SEAI (2011e)). According to the same author, indirect impacts have been as well considered key issues due to damage and destruction of habitat contributing to its modification and disturbance often leading to displacement of species. Wind farms can constitute barriers to vulnerable species interfering with migration corridors and other activities, such as breeding and feeding.

The entire area surrounding the infrastructure is the target of several actions (from land removal to deforestation) with severe consequences in vegetation and animals during construction work (see figure 9). Nonetheless Mendes et al., (2002) states that it is expected that most vegetation will face a gradual recovery during operational phase, especially if mitigation measures are adopted. On the other hand, it has been also emphasized that as most onshore wind power installations are sited in inaccessible natural territory, the investment in good accessibilities can represent an increase afflux of people posing a threat to vulnerable species and habitats.

Therefore, despite common perception that wind farms do not represent a menace to biodiversity, especially when compared with other human activities

(see table 3), it is still necessary to analyze such impacts and take them into consideration during planning stage. Otherwise there is a potential risk of underestimating the impact of the project on species. Despite these precautionary measures, that reflect a good practice, most studies (see Katsaprakakis, (2012); Leung and Yuan, (2012); Saidur et al., (2011)), have considered bird fatalities associated to wind farms as being almost negligible, especially when compared to other causes.

Table 3- Leading human-related causes for avian fatality in United States(Source: Rebecca, as cited in Saidur et al., 2011):

Human related causes	Number of birds fatalities/year (million)
Cats	1000
Buildings	100
Hunters	100
Vehicles	60-80
Communication towers	10-40
Pesticides	67
Power lines	0.01-174
Wind turbines	0.15

Knowledge about impacts concerning this issue has been considered to be crucial, in order to develop an industry with residual environmental impact. Consequently it is necessary to make an assessment with very clear guidelines before project implementation. This process should allow answering eventual concerns from different stakeholders regarding wildlife impacts while reducing costs and time delays of planning process and with this, possibly increasing its acceptability (SEAI, 2011f). Katsaprakakis (2012) further concludes that location of the wind park within or near environmental sensitive sites is ill –advised, and that specific measures should be adopted to ensure special protection to uncommon species, avoiding adverse impacts and promoting their safe “co-existence”(p.2864).

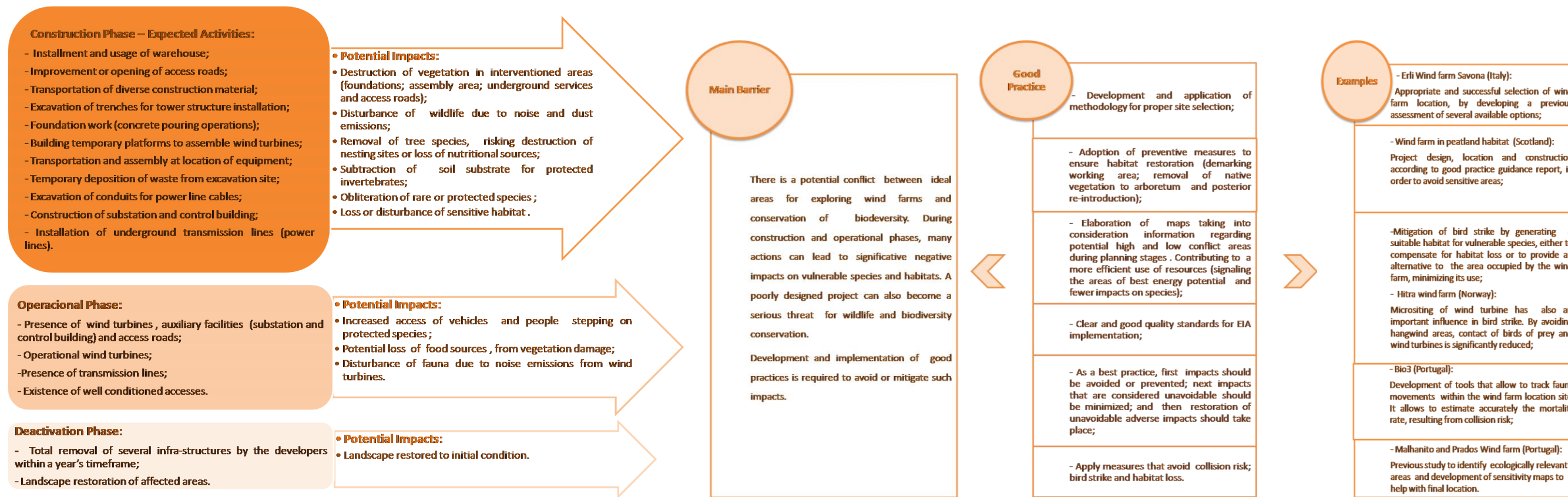


Figure 9- Wildlife impact management scheme. (Own elaboration; Sources: Mendes et al., 2002 and SEAI, 2011d ;e ;f).

Land occupation and usage impact

Land use impacts has been viewed in two perspectives: a more generic version associating the amount of energy produced and land occupation, along with a more detailed version focusing on main activities and adverse effects on this specific resource. Regarding the comparison of land use versus energy generation, Katsaprakakis (2012) has argued that the perception that RES required a more extensive area to deliver a similar energy outcome than other conventional energy sources is debatable (see Table 4). In contrast, with wind farms, that despite the rented area for installing wind turbines and auxiliary facilities being a somewhat extensive area, land occupation of a 3 MW wind turbine is a square surface of 1600 m² (40m per 40m), representing a fraction of total initial amount (see Mendes et al., 2002 and Katsaprakakis, 2012), although space taken by wind farms depend largely on design attributes, namely number of wind turbines and distance in-between them(see Miranda, 2007). Furthermore, contrary to thermal or nuclear plants, wind farms have been pointed out as being compatible with other activities (e.g. livestock and agriculture) (see SEAI, 2011g and Katsaprakakis, 2012).

Table 4- Comparison of land occupation required for energy production from different sources (Source: Katsaprakakis, 2012):

	Biomass	Nuclear	Coal	Natural gas	Hydro Power	Solar Power	Wind Power
Land Occupation (m ² years/GWh of produced electricity)	380.000	300.000	1290 - 25.200	4200	2350 - 25.000	9900	2040

Impacts affecting this resource and its use will be registered throughout different phases of the project, with particular emphasis on construction stage due to the high level of activities involving heavy machinery causing visible negative impacts on soil (see figure 10). Besides the area adjudicated to build different facilities that constitute the wind park, there are many activities that don't lead to permanent impacts, disappearing after construction work is over, like waste deposition originated from excavation site (see Mendes et al, (2002)).

Another impact that might cause significant problems is soil erosion. It has been directly related to loss and destruction of vegetation, and its severity proportional to the amount of flora removal. Vulnerability to erosion is also

increased due to land removal and circulation of people and heavy machinery, Mendes et al., (2002) also stressed the lack of draining systems and rain as being an added risk; therefore loose materials from excavation sites, should be incorporated in construction site, contributing to minimize adverse impacts on soil.

For wind parks located in sites with few aptitudes and interests, to allow agriculture or forestry, coexistence with other traditional activities, such as grazing livestock has been possible (SEAI, 2011g and Mendes et al., 2002). This might be perceived as a positive impact, especially by local farmers, taking place during both construction and operational phases.

To avoid amplification of potential impacts originated during construction work (Miranda, 2007) has suggested the application of minimization measures stipulated in Environmental Impact Assessment process.

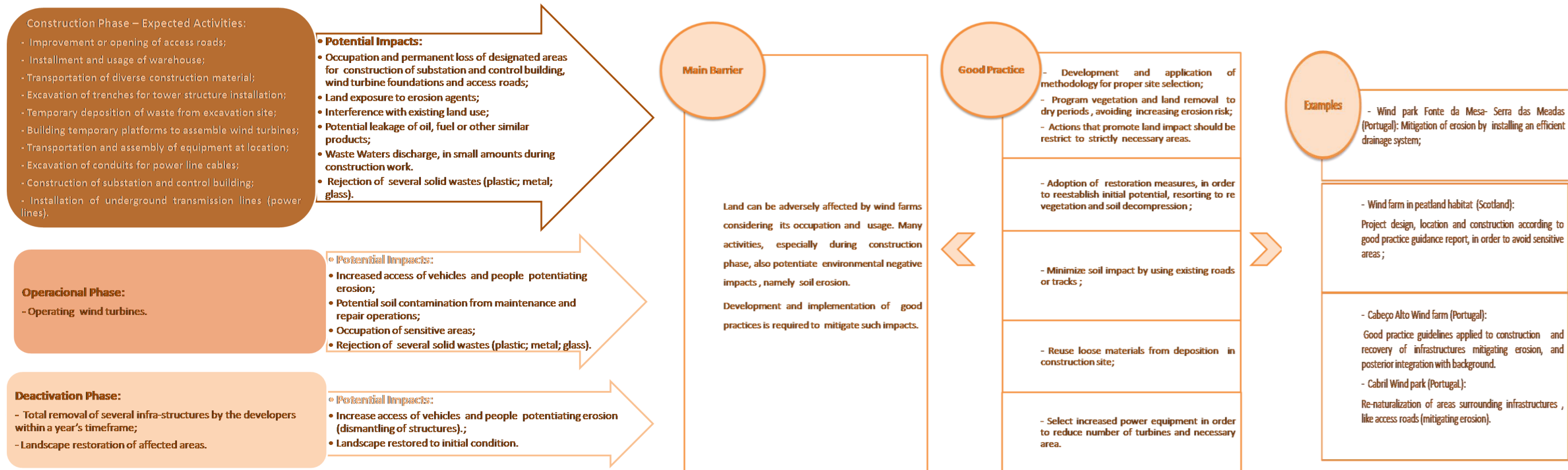


Figure 10- Land occupation and usage impact management (Own elaboration; Sources: Mendes et al., 2002 and SEAI, 2011g).

Water Resources Impact

According to SEAI (2011d), while land occupation has been viewed as having a localized character, an up scaling of impact's nature would occur if wind farms interfered with hydrologic resources. Due to the type of activities taking place during construction work (see figure 11), adverse effects on water patterns are more susceptible of happening here than throughout operational phase.

Miranda, (2007) and Mendes et al., (2002) have stated that wind parks may have repercussions on quality of superficial water courses; as a consequence of land removal; deforestation and ground-leveling activities, implying an increase of solid particles that are transported to water courses.

In consistency with SEAI (2011d) remarks, this damage has happened frequently mainly because wind farm developers have underestimated hydrological processes underlying the compound's location. The impact on water resources has been linked to other already mentioned impacts, such as habitat loss and destruction, contributing this way to enhance the significance of this problem. Therefore, during construction phase it has been considered important to guarantee that existing water courses are safeguarded, i.e. not obstructed by built infrastructure or incorrect deposition of debris resulting from excavations (Miranda, 2007 and Mendes et al., 2002).

As was previously mentioned, during the operational state, given that wind farms do not produce effluents, only maintenance procedures and repair of equipment might cause damage to hydrological patterns. In order to prevent adverse impacts, good practices are required by correctly handling and disposal of fossil fuels to certified waste management company (Miranda, 2007 and Mendes et al., 2002).

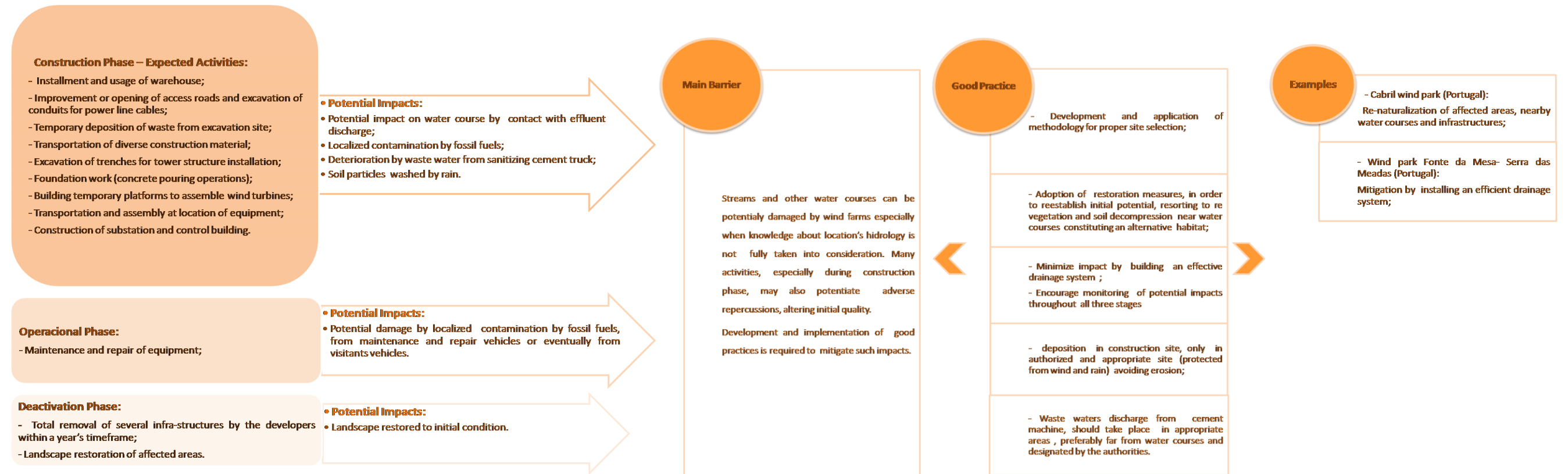


Figure 11- Water resource impact management scheme. (Own elaboration; Sources: Mendes et al., 2002 and SEAI, 2011d).

Shadow Flickering Impact

According to Katsaprakakis (2012), the probability of being affected by this negative impact increases with proximity to residential areas. This intermittent shadow casting across the landscape, has been associated with disturbance and annoyance accounts for local residents (Minnesota Department of Health and Environmental Health Division, 2009; Katsaprakakis, 2012 and Saidur et al., 2011).

Distance values seem to directly influence the probability of suffering such consequences, restricting it as it increases; Katsaparakakis (2012) has stated that, after a certain distance flickering is absorbed by the atmosphere becoming practically imperceptible. For the Minnesota Department of Health and Environmental Health Division, (2009) due to design attributes, shadow flickering should not be considered problematic for wind turbines at distances surpassing 1 km. This has been considered by some authors (see Burton as cited in Minnesota Department of Health and Environmental Health Division, 2009) as a minimum distance to prevent flicker occurrence.

During day time period, and because of the positioning of sunrise and sunset, moving shadows might pose a threat in the morning and evenings. Regarding this issue, Katsaprakakis (2012) affirms that residential areas might be affected for specific periods of time along the year, given the influence of different seasons in sundial route.

Besides being a potential issue for habitation areas, the Minnesota Department of Health and Environmental Health Division, (2009) draws attention to the fact that during sunset periods shadow flicker might pose a danger for drivers, decreasing their attention. In order to reduce driver's distraction, Ireland instituted a minimum setback distance of 300 m between wind parks and roads (Michigan State University, as cited in Minnesota Department of Health and Environmental Health Division, 2009). In order to avoid or mitigate this problem measures should be taken during project's design and planning stages (see figure 12), because as to Katsaprakakis (2012) underlined this impact can be timely predicted and avoided if it is addressed before project implementation.

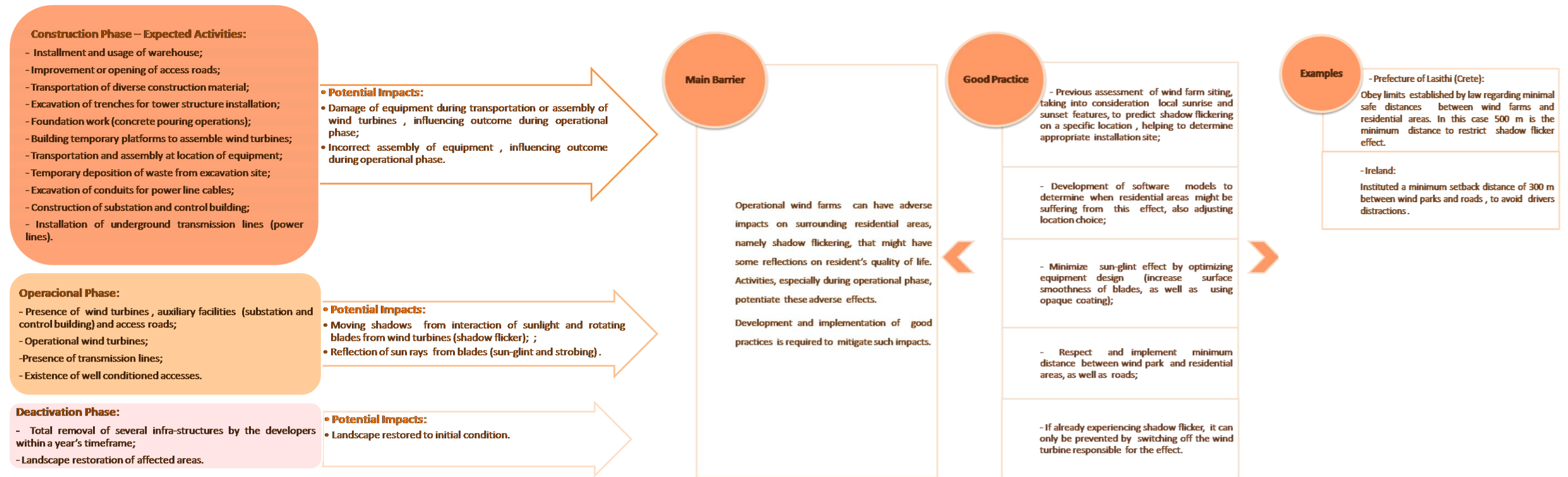


Figure 12- Shadow flickering effect management scheme. (Own elaboration; Sources:Mendes et al., 2002; SEAI, 2011b;Minnesota Department of Health and Environmental Health Division,2009 and Katsaprakakis, 2012).

Electromagnetic Interference Impact

Blade rotation can cause dispersion of electromagnetic signals, like radio or tv broadcast frequencies, resulting in variations of their transmission (see Miranda, 2007 and Katsaparakakis, 2012).

When compared to other approached aspects, this issue could be considered a minor concern (Miranda, 2007) mainly because this question has been more associated to initial wind turbines incorporating metal blades in their constitution. As a consequence of improvement in industrial design, wind turbines nowadays, are composed by synthetic blades interfering in the least with wave-length transmission (see Katsaparakakis, 2012).

Regarding concerns to exposure to electromagnetic radiation, the above mentioned author considered them as being unfounded. Electromagnetic field from wind turbines has been considered weak and restricted to a very small area surrounding wind turbine's facilities (see Katsaparakakis, 2012).

Such an impact could be avoided or mitigated by investing in appropriate design and location, complementary measures feature also investment in technologies that amplify signals, i.e. installment of supplementary transmitter poles (see Miranda, 2007 and Katsaparakakis, 2012).

An impact management scheme has been developed (see figure 13) in order to resorting to application of good practices avoid adverse implications associated to this issue, that might interfere with local community's quality of life altering their perception towards RES projects.

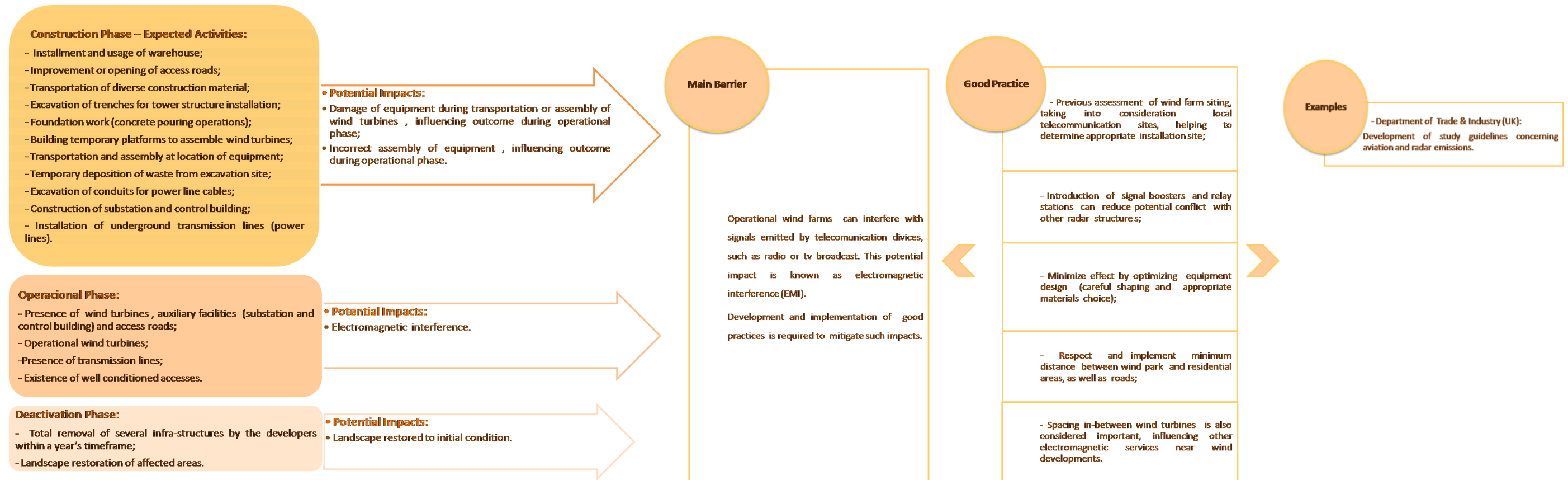


Figure 13- Electromagnetic interferences impact management scheme. (Own elaboration; Source:Mendes et al., 2002 and SEAI, 2011g).

Socioeconomic Impacts- Community benefit schemes

Wind energy is strongly connected to local communities, depending largely on their approval to enable its application. As a result of the effort to accommodate wind farms, communities have been contemplated with benefits, directly reflecting on local socio-economic scenario. Identified benefits schemes included “community funds”; “benefits in kind”; “project ownership” or “local employment”(see SEAI, 2011h:60 and RenewableUK, 2011). These examples have been taken as common approaches to community benefits, i.e. profits that communities perceive as real and concrete (see RenewableUK, 2011), as opposed to other options, such as investing in qualification skills; other renewable energy projects; energy efficiency and climate change awareness. Whether if this traditional view is adopted or more innovative approaches are undertaken to promote and engage local communities with RES projects, there are still some factors that could induce barriers to its deployment (see figure 14).

SEAI (2011i) underlined the importance of a straight forward communication strategy, focusing on predictable benefits in a detailed manner, as well as potential setbacks, in order to avoid prospective barriers. Suggesting this effort should go on throughout different stages of the project, accounting for local’s doubts and concerns. Resorting to independent organizations to access information and guidance has also been seen as a positive step towards community members defining their own perspective (see SEAI, 2011i).

Besides misinformation, another source of potential apprehension that may eventually trigger obstacles has been related to the relationship between established economic interests and new economic activities. SEAI (2011g) highlighted tourism; agriculture and keeping a herd or telecommunications as some of the areas where conflicts might occur, requiring a careful planning of the project to avoid objections. Community benefits schemes and the way they have been spent or invested have a crucial role in this subject matter (SEAI, 2011h). The improvement of social and economic condition resulting from proposed benefits, should be a consequence of a strategy with delineated objectives and targets involving national, regional and local authorities, alongside with promoters and hosting communities.

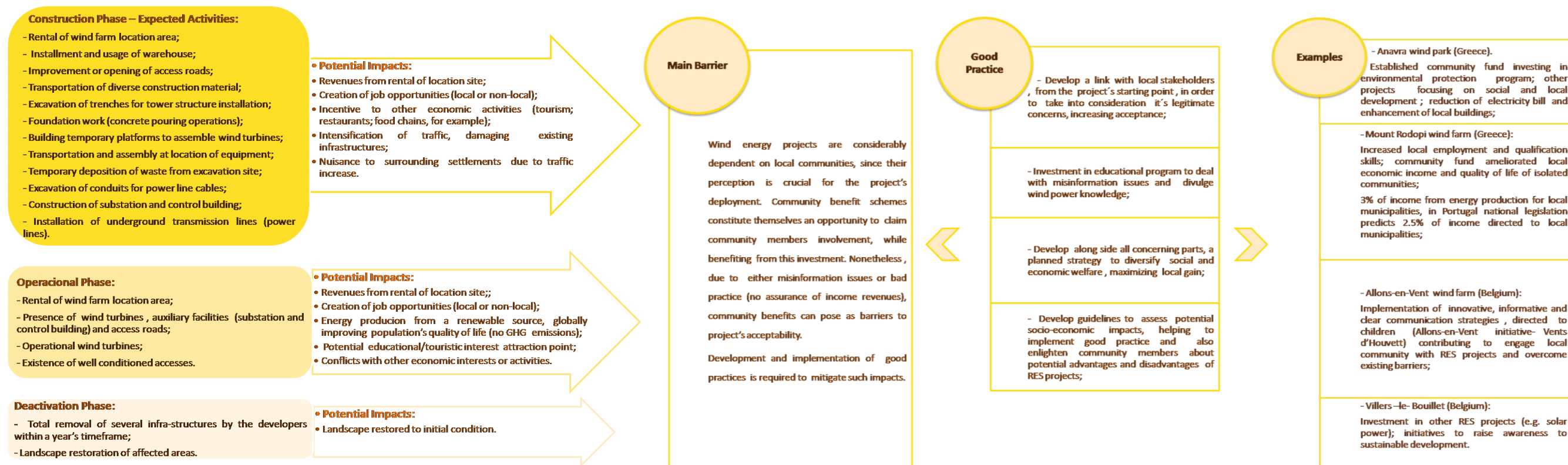


Figure 14- Socioeconomic Impact management scheme(Community Benefit Schemes). (Own elaboration; Sources: Mendes et al., 2002 and SEAI, 2011g;h;i).

Air Quality and Carbon Footprint

RES projects, especially wind power enable the production of energy, while simultaneously contributing to mitigate climate change issue, especially when compared to most conventional energy sources (e.g. fossil fuel based power plants or nuclear power plants), since according to SEAI, (2011j) it has virtually no GHG emissions during operational phase. According to Saidur et al., (2011), the decrease in emissions associated to greenhouse effect, such as carbon dioxide (CO₂), methane (CH₄), nitrous oxide (N₂O) could be reduced because wind energy has been contributing to shift electricity production from a fossil fuel based generation to a renewable system. It has been estimated by the World Energy Commission (as cited by Saidur et al., 2011), that 1 million kW of energy generated by wind turbines, can spare the release of 600 ton of CO₂. Therefore the replacement might help reduce air pollution avoiding negative impacts on the environment (see Table 5).

Table 5– Reduction of air pollution (Source: Saidur et al., 2011):

Gases	CO ₂	NO _x	SO ₂
Reduction on emission/year (short tonnes)	3251	20	421

Yet, during construction phase emission of discrete amounts of air pollutants is expected, due to activities restricted to a specific period of time. During operational phase, CO₂ emissions from wind parks have been associated to maintenance operations (see figure 15). A correct handling of waste generated during this stage (e.g. soil resulting from excavations responsible for dust emissions), and later direction to a certified waste management company, avoids potential impacts on air quality (Mendes et al., 2002). The same author also points out, the importance of implementation of accurate minimization measures, aiming to reduce or enhance its significance. During construction work, several guidelines should be followed and accounted for, by the compound developers, for instance training staff about consequences regarding negligent attitudes, as well as environmentally correct procedures (Mendes et al., 2002).

Another aspect that has been increasingly focused as far as wind farm proposal projects are concerned, is carbon footprint assessment. The balance of carbon

loss and gain throughout the life cycle of wind farm development, can influence stakeholders acceptability, based on “climate change benefits” (SEAI, 2011j). Saidur et al., (2011) has stated that comparatively to other alternatives, wind power has shown a low carbon footprint value (see figure 16), and that the energy used during the entire process that gives place to a wind farm (from fabrication, transportation, to construction of infrastructure) equals the amount of energy produced in a few months.

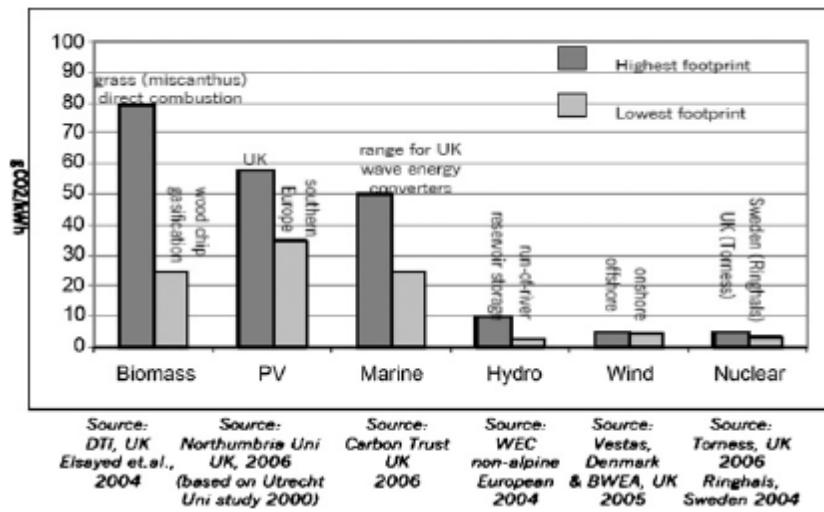


Figure 16- Comparative carbon footprint from different RES technologies. (Source: Saidur et al., 2011).

Although there is no consensual methodology to estimate carbon emissions, attributable to the fact that only recently this aspect has been taken into consideration during planning stage, good practice can be useful to manage and reduce carbon losses (see SEAI, 2011j).

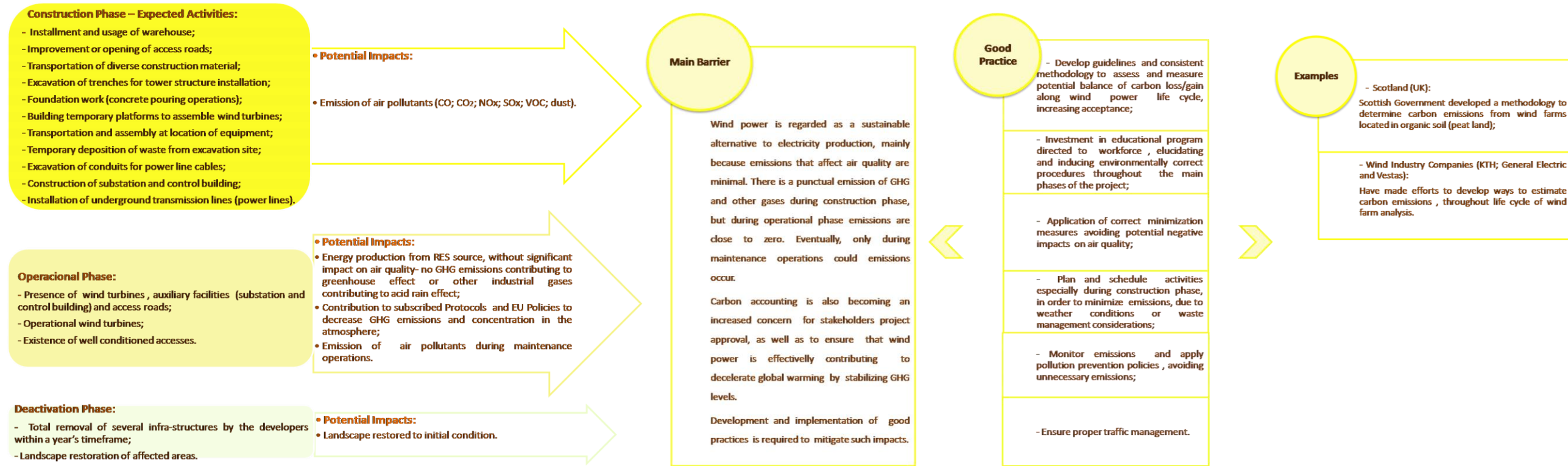


Figure 15- Air Quality and Carbon Footprint Impact management scheme. (Own elaboration; Source: Mendes et al., 2002 and SEAI, 2011).

Other impacts such as cultural or historical heritage sites, with relevant architectural or archeological elements; cumulative impacts or monitoring plans are also focused in EIA process.

Architectural or Archeological Patrimony Impact

In order to prevent negative impacts to existing cultural elements, preserving them for future generations while promoting its compatibility with wind farms it is necessary to make a detailed assessment of surrounding areas previous to implementation (Mendes et al., 2002).

In terms of harmonizing a modern infrastructure with background scenery simultaneously safeguarding local patrimony, SEAI (2011b) and Mendes et al., (2011) claim that there should be adjustments to design and other aspects during project's execution. If steps towards preservation have been taken throughout several phases of the project, wind parks could have a positive impact in promoting local historical or cultural landmarks (Miranda, 2007).

To better assess the implications and potential impacts associated to this issue, an impact management scheme was developed for this theme, stressing the importance of preventive measures, through the application of good examples avoiding or minimizing potential adverse impacts (see figure 17).

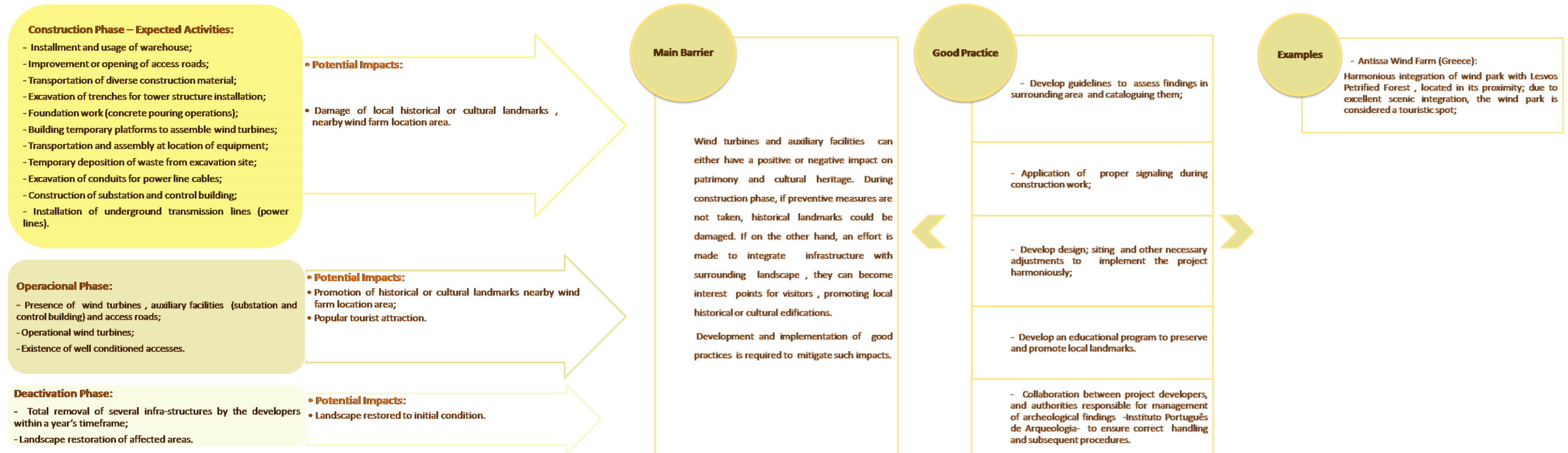


Figure 17 - Architectural or Archeological Patrimony Impact management scheme. (Own elaboration; Source: Mendes et al., 2002 and SEAI, 2011b).

Cummulative Impacts

Wind energy has been considered a mature and sustainable technology to substitute conventional energy sources in electricity generation. Nonetheless, Leung et al., (2012) has underlined that in a future context as a crescent number of wind farms is built, many impacts that nowadays are viewed as being unimportant might prospect devastating effects. Cumulative impacts may precisely result from minor individual actions, that have collective significance throughout a period of time (Partidario and Jesus, 2003). Therefore, depending on other activities and their effects, in the same geographical area of the project, cumulative impact can affect several environmental factors (from landscape; biodiversity; noise or socioeconomic parameters).

Although existing in national legal frame, the definition of cumulative impacts is still controversial and can lead to different interpretations. Regarding this question SEAI (2011k:18) stated that cumulative impact's meaning has been considered tricky, since it can also encompass "indirect impacts and impact interactions".

The increased interest in approaching such impacts is linked to this multifaceted character, potentially originating obstacles to wind farm's deployment. According to SEAI (2011k), most of the approval processes developed have been focused specifically on an individual complex, often underestimating cumulative impact assessment (CIA). The same author also pointed out that, this risk is frequent, despite CIA being legally required in EIA process.

A more systematic and strategic approach, that promotes good practices as the ones applied in Scottish wind farms, providing a well established course of action for developers with engagement of hosting communities and Non-Governmental Organizations (NGO's) for appropriate location, and exchange of knowledge between local and national authorities can effectively increase approval (see SEAI, 2011k) while helping to mitigate some impacts, and subsequent interactions with other activities.

Monitoring Plan

According to national legal framework, EIA process should include an environmental monitoring program. This process consists of systematic observation and collection of measurements from several parameters, allowing to describe and to provide data to assess wind park's impacts on the environment (Mendes et al., 2002 and SEAI, 2011). Results are then published in periodic reports by promoters, with the main objective of securing the assessment of the effectiveness of mitigation measures adopted to avoid, minimize or compensate impacts associated to project's deployment (Mendes et al., 2002). Wolsink (as cited in SEAI, 2011) claims that projects that effectively consider mitigation techniques, to prevent and reduce potential social and environmental damage have had an encouraging effect on citizens perception. The foremost barrier, has been precisely associated to this issue of unsatisfactory and below the standard impact assessment which underestimates the need to monitor and appropriately mitigate predictable impacts, directly affecting stakeholders approval of projects (see SEAI, 2011).

Besides the abovementioned, monitoring reports also help environmental knowledge consolidation regarding RES projects, improving impact assessment for future projects in similar conditions (Mendes et al., 2002).

2.5 Concluding Remarks

In conclusion, despite the present national scenario of “significant external dependence” the application of legal resolution nº 29/2010 aimed to propitiate conditions to improve this situation by stimulating the resource of RES, along with energy efficiency measures, while stimulating economy with projects within this scope. Allowing to reconvert energy supply system to a much more “competitive and cleaner” version (see European Union, 2011a:23), therefore sustainable industry, adapted to the prospect of a future “low-carbon economy”. However, the current economic recession has inevitably affected national energy policy, with the latest version of PNAER stipulating a reduction of 23% regarding wind power, potentially impacting the accomplishment of subscribed targets. In order to continue the transition towards a more sustainable development, it is necessary to reevaluate and redefine a course of action towards RES, since it plays a strategic role in this context.

The development of wind energy respecting socioeconomic and environmental standards, is considered vital, although still many challenges need to be overcome. Therefore, a step forward in solving current problems in the energy supply system, would be recognizing, especially concerns in energy security issues and, reaching an equilibrium between energy demands and industry sector while contributing to decrease pollutant emissions and benefiting local communities. Most of these challenges or barriers emerge from ignoring or underestimating potential impacts during EIA process, ultimately affecting local communities’ perceptions and will to engage and accept wind energy deployment.

To achieve efficiency, i.e. to maximize electricity production and at the same time avoiding resource misuse, accurate and robust impact assessment is crucial. Furthermore a careful planning approach, taking into consideration a detailed impact analysis, stimulating a positive interaction with stakeholders is able to surpass barriers and contribute to increase wind farm sustainability. Sharing information and experience engaging local community, promoters, authorities and other stakeholders is the key to develop policies and guidelines that lead to good practice throughout wind farms life cycle, contributing to make wind energy a more viable option for future electricity generation, contemplating local sustainability.

Chapter 3

Research Methodology

3.1 Introduction

Methodology has been viewed as being essential to define a research study. Social aspects within RES projects can be approached from different perspectives whether a qualitative or quantitative path is taken. Both methodologies give insights with own characteristics, resulting from the chosen philosophical approach and associated techniques. There are different perspectives to interpret social dimension, the adoption of one view, implies embracing a certain way of examining, measuring and grasping social reality (see Neuman, 2003).

Considering social research investigation there are several research models that facilitate the identification of a certain type of data collection and design study (see Neuman, 2003; Saunders; Lewis and Thornehill, 2007 and Crotty, (as cited in Elsayed and Jones, 2008). Despite the research strategy adopted, the most important issue is that it should allow answering the research question and attending its main purpose (see Saunders, et al., 2007).

A recent literature review concerning social issues and qualitative research methodologies in RES projects, showed that despite the increasing relevance of the theme, social dimension is far from being fully explored. Social aspects have been analyzed in a global scale, generally focusing on employment generation; community funds and partial project ownership. In exposed examples, mixed-methodologies were frequently used, and qualitative methods were able to complement and validate previously obtained information gathered by quantitative methods.

In view of what has been exposed regarding the relevance of methodology, it was considered vital to establish certain aspects (philosophical concepts and techniques), prior to fieldwork.

The main questions of what is considered important and how it is viewed by the participants, were answered by following an integrated research design featuring interpretative insight, along with an exploratory research purpose applied to a case study scenario. This attitude within the investigative process allowed to approach and answer questions that were not taken into consideration previously, or that were only studied in a superficial manner (see Raupp, and Beuren, (nod) and Neuman, 2003). In a first stage, a literature review was developed, as well as a pilot exploratory interview and several work meetings, helping to develop interview

guidelines. In order to obtain an accurate description and interpretation of social phenomena from the perspective of the stakeholder, semi-structured in-depth interviews were selected. This technique was viewed as being appropriate due to its flexibility characteristics, allowing to achieve a detailed account of social impacts, in accordance with the research purpose and available logistics (see King, 2004).

After transcription, the information was analyzed resorting to its reduction and display, including summary writing; identification and interpretation of patterns, allowing to make connections and withdraw conclusions (see Rubin and Babbie, 1997 and Miles, and Huberman, 1994).

3.2 Review of Research Methodologies Concerning RES Projects

As the public awareness and interest for RES projects grew, social and environmental issues became increasingly addressed in power planning and its decision - making process.

The social dimension of a project fits in the social sciences field. In order to gather and analyze data in this area, that fully reflects the impacts of these projects on local sustainability, both qualitative and quantitative research methods are required.

Despite this, results have shown that when assessing public perception regarding RES projects, quantitative methods seem to prevail, often mentioning the use of surveys (see Ribeiro; Ferreira and Araújo, 2010). Although surveys have been pointed out as a popular methodology for social research, its disadvantage lies precisely on its inability to fully assess social dimension (Rubin and Babbie, 1997); supporting Aitken's (2010a:1835) claim of being considered a controversial way to study "public attitudes and responses". The same author also heightened how qualitative methodologies have recently been perceived as being appropriate to assess public perception taking into consideration the "complexities" of public opinion.

Quantitative data provide a meticulous and objective side but without being able to focus on impacts at a local community scale and by this, offering only a panoramic view of the picture. Qualitative data in contrast, has been able to capture impacts that otherwise would pass unnoticed, essentially due to the richness of detail (Del Rio and Burguillo, 2009b). As a result of that, it has been frequently considered the best option to determine how wind turbines are perceived by different social backgrounds, "within and across communities" (Devine-Wright, as cited by Aitken, 2010a:1835).

These observations reflect the opposing natures of these two approaches to social reality, revealing that in order to opt for either of the research methods, it is necessary to explore the connection between theory and research. However, there have been so many conflicting opinions concerning "name, the order and

the nature of research stages” (Elsayed and Jones, 2008:11), rendering it difficult to establish a social research conduct.

According to Rubin and Babbie, (1997) theory has played a relevant role in social research, allowing to corroborate the existence of previously established “logical relationships” (p.42). To comprehend the logic behind some of the major options used to establish this link during inquiry, the acknowledgement of the main types of philosophical streams concerning social science, has been considered essential (see Neuman, 2003). Denzin and Lincoln, (2000) stated qualitative research should be viewed as a process encompassing several stages and, interconnecting several concepts, that define an approach to social scientific research from a global to an increasingly detailed scenario. However, because this concept is much more flexible and “open-ended” than conventional science, many different versions of interaction between “logic, observation and theory” can be developed (see Rubin and Babbie, 1997:56). Such is the case of the three following models developed by Neuman (2003); Saunders; Lewis, and Thornhill, (2007), and Crotty (as cited in Elsayed and Jones, 2008).

While Neuman’s (2003) model has featured the four dimensions of the research in order to achieve the best research strategy; Saunders’s et al. (2007) has been entitled “the research onion” model, encompassing six research stages (“philosophy; approach; strategy; choices; time horizons; techniques and procedures”) and Crotty’s (as cited in Elsayed and Jones, 2008:2) vision categorizing social research in four phases (“epistemology; theoretical perspective; methodology; methods”).

Given the nature of a certain investigation, there can be many possible strategies for social inquiry. Neuman’s (2003) model has allowed the researcher to recognize the compatibility of the question within the investigation to a certain type of data collection and design study (see Table 6).

Table 6- Dimensions of Social Research Methods (Source:Neuman, 2003):

Research Dimensions	Major Types
How research is used	Basic; Applied
Purpose of the study	Exploratory; Descriptive; Explanatory
The way time enters	Cross - sectional; Longitudinal; Case Study
Technique for collecting data:	
- Quantitative Data	Experiments; Surveys; Content Analysis; Existing Statistic Studies.
- Qualitative Data	Field Research; Historical Comparative Research

On the other hand, Saunders et al., (2007), developed a layered approach defining different possibilities for connecting theory to research in order to structure qualitative research allowing its application to field investigation (see figure 18);

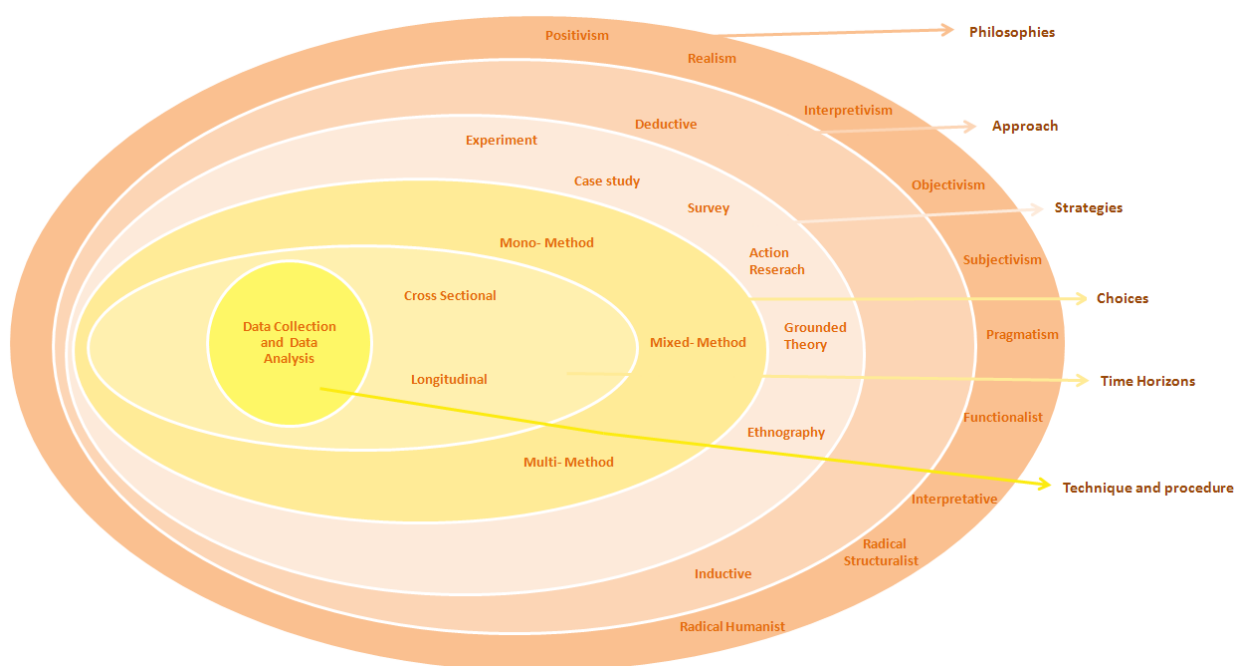


Figure 18- "Onion Research" Model (Source: Saunders et al., 2007).

And last but not least, Crotty (as cited in Elsayed and Jones, 2008) has exposed a simplified version of Saunders et al., (2007) approach (see figure 19).

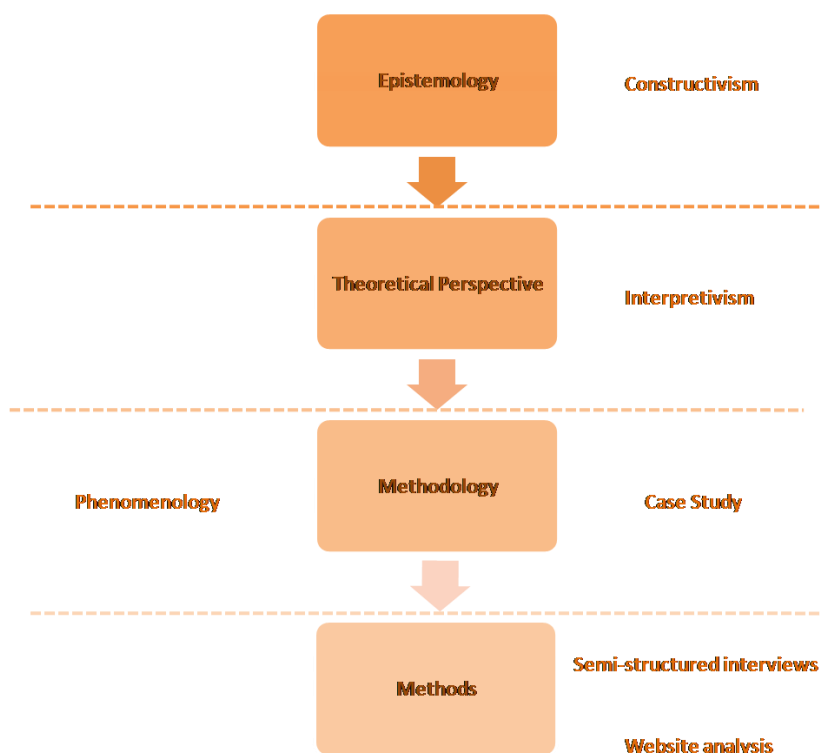


Figure 19- Crotty Research Stages Diagram (Source: Elsayed and Jones, 2008).

By establishing the connections between several levels suggested by each approach a step forward is being given, in order to establish a research design that provides a logical link between a broader theoretical perspective, to a “strategy of inquiry” connecting researchers “to methods of collecting and analyzing empirical” data (see Denzin and Lincoln, 2000:18). These methods can either be of a qualitative or quantitative nature, such as interviews or surveys, developed in order to achieve the researchers aim.

Comparatively all of these social research plans show similarities and divergences, concerning theoretical background, and the way it is approached, but always featuring both quantitative and qualitative methods. For instance, although sharing common ground on the way different stages should be addressed; as well as on the fundamental role of defining a global framework, providing the basis in which research techniques have been founded and researches conducted (Neuman, 2003), many differences have been noticed concerning what paradigm designation entails. This aspect has also been observed by Rubin and Babbie. (1997:38). The author stated that confusion could be brought up due to the fact that “different authors” attributed “different labels” to paradigms, along with a lack of consistency in their definition.

Whilst according to Lincoln and Guba (2000) a paradigm could be defined as a belief system that conducts “action” comprising four notions: “axiology; epistemology; ontology, and methodology”(p.157); for Saunders et al. (2007) these beliefs (epistemology; ontology and axiology) ascribe the main philosophical guidelines for investigation and not paradigms. He views paradigm as the way one observes social phenomena, from which one could obtain its understanding, identifying its causes and own explanation. Being supported in four concepts: “functionalist; interpretative; radical humanist and radical structuralist” (Saunders et al., 2007). These four “abstract paradigms” become increasingly more complex (Lincoln and Guba., 2000) as the system becomes more detailed; implying that graphically, philosophy and paradigm become represented in the same outer layer of the “research onion”. This problem of mixed terminology is avoided by Crotty’s model, which by “narrowing down” existing research stages, has presented a “clearer” approach, considering only epistemology for paradigm (Elsayed, et al, 2008:12). Neuman (2003) similarly to Saunders et al., (2007) view, also presented philosophical approaches and perspectives, however diverging in the type of philosophies or general constructs underlying the research, since Neuman (2003) considers three main insights: “positivist social science; interpretative social science, and critical social science”(p.70). This “logic model” presents many advantages for inexperienced researchers, since it allows a topical approach to a multi-dimensional field, where each concept of this process is connected to a multiplicity of complex and interrelated options. Connecting each dimension to specific types of research, sets boundaries, making the process less overwhelming; otherwise as Denzin and Lincoln (2000) mentioned multiple global frameworks or paradigms can suppose or imply resorting to several “research methods and strategies”(p.6).

Ultimately the main differences between exemplified models are the premises associated to each of these theoretical frameworks, and the questions they pose to social research. Whereas epistemology focuses on knowledge considered acceptable in a certain area, approaching the question “what is the relationship between the inquirer and the known?”; ontology verses the nature of reality and phenomena, approaching the question “what kind of being is the

human being? What is the nature of reality?"; axiology is related to ethics, studying judge of value, approaching the question "how will I be a moral person in this world?" (see Lincoln and Guba, 2000:157 and Saunders, 2007).

Although there may be several takes on these "abstract principles", making it quite a "problematic and controversial" subject, Denzin and Lincoln (2000:19) pointed out that research as a whole could be viewed as being interpretative, guided by a value system and "feelings about the world and how it should be understood and studied". Each of these global frameworks actively influences the questions instated and subsequently the "interpretations the researcher brings to them" (see Denzin and Lincoln, 2000:19).

Regardless of this critical insight, "the research onion" model representation has a positive aspect in comparison to other approaches, providing a very detailed outlook, exposing important aspects of research process, such as "choices" and "approach" not directly patent in other diagrams. These two steps constitute the main key issues discerning quantitative and qualitative methods i.e. in determining the nature of used techniques for data collection and analysis (see Vieira, 2007) as will be further explored in Section 3.4. The linking of quantitative and qualitative data is nowadays a reality in most published researches concerning RES, and often plays a significant role in developing a successful analysis (see Miles, and Huberman, 1994).

Nonetheless and despite many reasons and possibilities behind social research the fundamental issue is ensuring that the chosen technique answers the research questions and accomplishes the researcher's main objective (Saunders, et al., 2007).

3.3 Social Research in RES Projects

A recent literature analysis reflected that, although most works related to energy refer to sustainability issues, very few of them, actually include social key issues concerning power planning (see Ribeiro et al., 2011). This lack of evidence regarding socio-economic aspects at local or regional levels is also identified in Environmental Impact Assessment (EIA) processes ((SEAI), 2011a).

Many of the studies regarding RES projects (see Blanco and Rodrigues, 2009) focus the social aspect from a very broad perspective, usually very attached to a political, economic or environmental agenda. Issues mainly related to the global advantages brought by this type of project have been frequently mentioned, namely: the project contribution to meet a constant demand for energy supply with an endogenous and renewable resource; the reduction of the dependence on fossil-fuel imports and the contribution to a substantial reduction of GHG emissions.

Concerning this problem Ribeiro et al., (2011) stated that, economic as well as environmental issues, are more easily measurable, being addressed more extensively than the social concerns. These last ones have been approached in a more subjective perspective, requiring frequently expert input on multi-criteria decision methods. The importance of taking social aspects into consideration during power planning is not a consensual issue, due to the vastness of the social dimension under the sustainable development concept (see Ribeiro et al., 2011).

Therefore in order to reflect the dynamic nature of public opinion, and within qualitative research, the interview, persists as the most popular technique for obtaining information regarding social aspects. Silverman (2004) detaches that about 90% of social research investigation employ interviews, as a methodological approach.

In a large majority of studies analyzed, this specific method was used as a complementary way to acquire information about social impacts. Nonetheless this methodology, (more specifically semi-structured interviews), has been foreseen to take an important role in future research due to its “openness” (see Ribeiro et al., 2011:4367). This characteristic was essential to address the following aspects of social dimension regarding energy planning and RES.

3.3.1 Participatory Approach

Most researched author's (see Allan; McGregor and Swales, (2010); Del Rio and Burguillo, (2009b); Del Rio and Burguillo (2008a)) agreed on the importance of participatory approach, i.e., the involvement of different stakeholders in the decision-making process, to develop a successfully sustainable RES project.

Different points of view during this process ensure stakeholder's best interest in issues related to social impacts is secured (see The World Commission on Dams, 2001, as cited in Ferreira, 2007). In the same way, the local population interests and opinions concerning the distribution of benefits among stakeholders; as well as how this fact influences the approval of the project is properly acknowledged (see Del Río and Burguillo, 2008a).

It has also been recognized (see Del Rio et al. (2009b); Allan, McGregor and Swales (2011); and Rogers et al., (2008)) that RES projects associated with high levels of public participation, showed a better chance of acceptance by local community. However, Rogers at al., (2008) claimed that not enough research has been developed in this area. In order to further explore the relationship between RES projects and public participation, Rogers et al., (2008) resorted to a case- study. Data collection was provided by mixed methods (featuring surveys and semi-structured interviews), with the aim of obtaining a full picture of which social aspects influence community's response to RES projects.

Rogers at al. (2008) data analysis revealed that, although there had been a wide acceptance towards RES projects, and the will to take a more active role in the process, the instigation of this option in rural areas is difficult. Conclusions advert to the need to provide technical support to local population, in order to raise awareness to communities that are clearly enthusiastic to actively develop a RES project.

This sort of approach, may also lead to supplementary benefits renewing people's interests for environmental preservation and energy sustainability issues.

In addition to this, Allan et al. (2011) pointed out that, developing ways to identify plausible impacts for the local community is now recognized as a fundamental task, as public perceptions are increasingly viewed as vital to the successful acceptance of the proposed project. Policies focusing on the socio-economic development of isolated rural areas must then properly account for the positive and negative impacts. To acknowledge local stakeholders perceptions is also increasingly critical and even essential for the project approval (see Allan et al., 2010). In line with this, Wiegand (as cited in Allan et al. 2010) argued that rural areas where community benefits were previously predicted found a solid local encouragement for RES projects.

The framework developed by Del Rio and Burguillo (2009b:1316)-“stakeholder analysis”, was later applied (with few adaptations) to a case study in Japan (see Izutso; Takano; Furuya and Lida (2012)), in order to evaluate the activity of stakeholders in promoting RES policies. The framework was tested for gradually implemented projects in a local community area, aiming to ensure a sustainable lifestyle change. The so called “Driving Actors” were found to be vital for local promotion and implementation of RES projects. Communication between different stakeholders was also perceived as being relevant to compel this type of project (see Izutso et al., 2012).

This social aspect should be taken into consideration while evaluating RES projects, since one of the most frequent reasons evoked to oppose this type of project has been the inadequate “communication and consultation” between different stakeholders (Sinclair and Lofstedt; Toke; Upham and Shackley and Upreti as cited in Rogers et al., 2008:4217).

3.3.2 Employment Generation

One of the most common social aspects, within RES projects investigation is related to the direct effects on employment resulting from renewable energy deployment.

A preliminary scrutiny of the existing literature, reveals that for most works the impacts of RES projects, mainly the prospect of employment generation are studied according to a multi-method approach. Several authors (see Sastresa; Usón; Bribián and Scarpellini (2010); Allan et al. (2011); Blanco and Rodrigues (2009); Del Rio and Burguillo (2009b) and Cuartas and Menéndez (2008)) seem to empirically agree with the common statement that renewables have a positive impact on the socioeconomic scene, as far as employment generation is concerned. For different case studies, both Sastresa et al. (2010), and Cuartas and Menéndez (2008) reached a similar conclusion, predicting that RES projects would have a great effect on employment issues, Del Rio and Burguillo (2009b), further observed that although global number of jobs is not overwhelming for RES projects, it was still determined to be the most significant impact at a local scale. This is especially relevant considering the developmental challenges of contemporary rural communities, frequently characterized by high unemployment rates, desertification and dependence on a dilapidated agricultural system (see Del Rio and Burguillo, 2009b).

Sastresa et al., (2010), focused on developing a multi-method to proceed to evaluate the socioeconomic impact of RES projects, with special attention to employment generation, because jobs created were perceived as the “most direct measure of the socio-economic potential of RES”(p.679). This case study was carried out in (Spanish “autonomous community of Aragon”) (p.679), a sampled group of 126 companies whose activities were directly related to RES. Several on – line surveys were submitted to diverse stakeholders within a company, to complement this, numerous semi-structured interviews were undertaken, providing data validation.

Sastresa et al., (2010) concluded that along with a stagnant employment rate with reference to the more traditional energy sector, there has been a continuous growth tendency of the employment rate, concerning new energy

sources. The same way, concerning this specific study case, the results indicate that RES is able to generate an estimated 4 to 1.8 times plus work positions than conventional energy sector.

The framework developed to assess the impact of RES projects especially data regarding employment creation, should be easily applied to a different scenario, provided that data specific to the case study region must be incorporated, as well as taking into consideration indicators that influence employment throughout different stages (see Sastresa et al., 2010).

Another case-study concerning the prospect of employment generation resulting from RES projects, was developed by Cuartas and Menéndez (2008). In this case study, the authors also resorted to a multi-method approach (that entails both qualitative and quantitative viewpoint), in order to obtain computed forecasts showing the effect of RES development on employment “from both a quantitative and qualitative perspective”(p.733).

As a result of the study, the forecast scenarios showed that the RES projects with the most potential positive outcome in the Asturian region were solar (thermal and photovoltaic) energy and wind energy. The computation results also illustrated that RES jobs would have a constructive effect on this area, balancing the unemployment rates from more traditional sectors of activity. Regarding a “skill requirement analysis”(p.22), jobs created would require specific professional qualifications and training, such as technicians; installers and engineers. In this context, Cuartas and Menéndez (2008) also urged authorities to invest on providing educational services, making an active contribution towards future regional progress and competitiveness.

The work developed by Blanco and Rodrigues (2009), also seem to support the ideas featured in previous mentioned studies, that RES projects and more specifically the wind energy sector is one of the main contributors to job creation. At an EU level; estimates of its direct effect on employment generation are around figures like over 104,000 in 2008. Blanco and Rodrigues (2009) also mentions the current insufficiency of a qualified workforce and the need to implement measures that stimulate tools, in key areas such as education and mobility to fight this breach.

This source of employment, is at the same time, very diverse and linked to the many different stages of wind power generation, involving activities of construction; technical support; legal advisement and environmental impact assessment studies (see Blanco and Rodrigues., 2009). Both Sastresa et al. (2010), and Blanco and Rodrigues (2009) researches support that wind energy units raise the employment rates, in an inverse tendency to majority of the rest of the energy sector; and that as a future perspective, promoting relocation of taskforces from other energy fields should be encouraged, contributing for social and economic sustainability (see Blanco and Rodrigues, 2009).

In order to obtain the latest data, that allowed for a research to deliver accurate estimates of employment directly ascribed to wind energy, Blanco and Rodrigues, (2009) has resourced to mixed-method, using surveys and in-depth interviews with key stakeholders accompanied by a thorough document analysis and collection of expert opinions, to ensure reliance. With the application of such methodologies, the authors were able to examine other aspects related to employment prospection, such as patterns, male gender predominance in this sort of industry and lack of highly qualified workers (see Blanco and Rodrigues, 2009).

In order to assess the contribution of RES impacts to sustainable development of a rural region, Del Rio and Burguillo (2009b:1316) has developed a framework - "Stakeholder analysis". The framework focused on collecting and examining data from different people or organizations of interest to the process, with the final aim of determining whose concerns should be considered while formulating energy policies; facilitating the contact between the policymaker and key stakeholders regarding the approval of the implementation of a certain program (Schmeer, as cited in Del Rio and Burguillo, 2009b).

The process was based on a series of interviews with local stakeholders. Obtained information was later complemented by a telephonic version (see Del Rio and Burguillo, 2009b).

Results led the authors to conclude that, although job creation has remained the most significant impact at a local level, for a rural community, other aspects, should not be overlooked. Benefits such as the payment of rents, and

investment in the educational system (funded library and “educational house”), contribute to a diversified optimistic outcome to these isolated communities, increasing local social welfare.

Therefore, Del Rio and Burguillo (2009b), suggested that RES projects should be regarded certainly as one of the alternatives (among many others) to develop policies for a sustainable development, considering the three main pillars: social, economic and environmental.

3.3.3 Other Benefits: Community Funds and Project Ownership

Munday et al. (2011) has proposed a methodological approach, incorporating both quantitative and qualitative aspects for determining opportunities for rural areas as a result of wind power developments in Wales. Information regarding community benefits was gathered firstly by document review and analysis, as well as telephonic surveys; in order to complement the existing data, semi-structured interviews were developed, to identify what sort of benefits, if any, had been provided. Information gathered from the interviewees was fundamental to formulate new insights, and to corroborate information collected previously by surveys.

The author further concluded that, the economic outcomes concerning this kind of investment for rural areas in Wales, was still open to discussion; mainly because, the current situation regarding community benefits, was still susceptible to alterations. These might include new stipulations regarding this subject (in addition to other issues like “local employment or environmental enhancements”).

Even though these benefits schemes have become increasingly more common, and can take on many forms (investment in communitarian social infrastructure; educational and energetic efficiency measures, etc), Munday et al. (2011), underlined that they were still not thought through in a strategic manner. This observation led him to the conclusion that the revenues from RES projects were globally limited.

As another conclusive remark, Munday et al. (2011), suggested that RES project ownership might increase the socio-economic outcome in rural areas. Conclusions along the same line were withdrawn from a case-study developed by Allan et al. (2011). The authors claimed that, community benefits, especially shared income were vital to ameliorate socio-economic standards in regions that such projects were implemented. Results showed that, community benefit's positive effects were even stronger when combined with “shared-ownership scheme”.

In case studies where other sort impacts (such as community funds and shared ownership of the project) were registered, Allan et al. (2011), also stated that the employment issue, including local sourcing during operation and maintenance phases, had a considerably minor effect.

A recollection of community benefits has been presented by RenewableUK (2011). The case-studies featured show the nature of different benefit schemes, as being a positive rapport between the promoters and local stakeholders. Most of the examples (from 2005 to 2011), provided the following arrangements and expected impacts:

- Establish a trust fund that manages contributions resulting from RES projects. Trustees evaluate proposals and deliberate about the attribution of funding. Project proposals should engage local community, contributing to increase “economic, environmental, educational, social or cultural” welfare.
- “Cefn Croes wind farm (2005)”, supported activities that promote positive impacts on the environment. Investing in the restoration of original habitats, degraded by intensive exploration of resources from previous forestry and agriculture activities; other benefits were achieved, that allowed to stimulate the relationship between local community and environment, for e.g. race tracks through the forest built by wind farm developers.
- “Burton Wold wind farm (2006)” community funds favored measures concerning energy efficiency problem (including tutorials programmes regarding RES and energy efficiency).
- “Earlsburn wind farm (2007)” took a different approach to community profits, adopting partial ownership of the project. Community benefits were increased, contributing to donate grants to charity, improving social equity, while reinforcing the sense of community and involvement in RES projects.
- “Vectis Wind Farm (2011)” established a contract with a non-profit-organization to ensure that local community accesses cheaper and greener energy.

Although community benefit schemes have been considered a common practice in RES projects, it is still not a formal institutionalized practice. In order to provide more than the existing guidelines, RenewableUK (2011) developed a protocol coordinating governmental and local authorities with different stakeholders. This instrument is not a review of several existing forms of community funds, but a framework that allows local communities to engage more actively in RES projects. From the application of this protocol a certificate is issued, contributing to the transparency of the benefits associated with wind farm developments.

3.4 Selection of the Appropriate Qualitative Methodology

The main objective of this work is to determine, social impacts of renewable energy projects at local and regional level, in the context of a northern Portugal region. In order to achieve this goal, an investigation strategy was developed, based on a qualitative research approach.

To develop a successful field social research investigation it is necessary to have an integral perception of what it entails; Rubin and Babbie, (1997) stated that viewing research process holistically has been fundamental to “create a research design”(p.94). For Saunders et al., (2007) and Quivy and Campenhoudt (as cited in Silva, nod) this process has a sequential basis that requires defining research topic; conducting literary review; delineating investigation steps, establishing the overall design (techniques for data recollection and analysis); sample selecting; data collection and comparative analysis between the expected results and the empirical findings and conclusion remarks and finally reporting obtained results. These similar visions will be adopted here in order to complement the research design created and based on Saunders et al., (2007) and Neuman’s (2003) approach to social inquiry. The aim is to address “some basic elements” that configured the research process and were not directly perceivable from a global approach, requiring additional decisions concerning steps of the abovementioned research process.

Before undertaking field research, there are some aspects (for example, literature review or data collection techniques) that should be discussed and established. Opting for Quivy’s and Campenhoudt(as cited in Silva, nod) suggestion of a pre-established process (see figure 20) allows to address such issues.

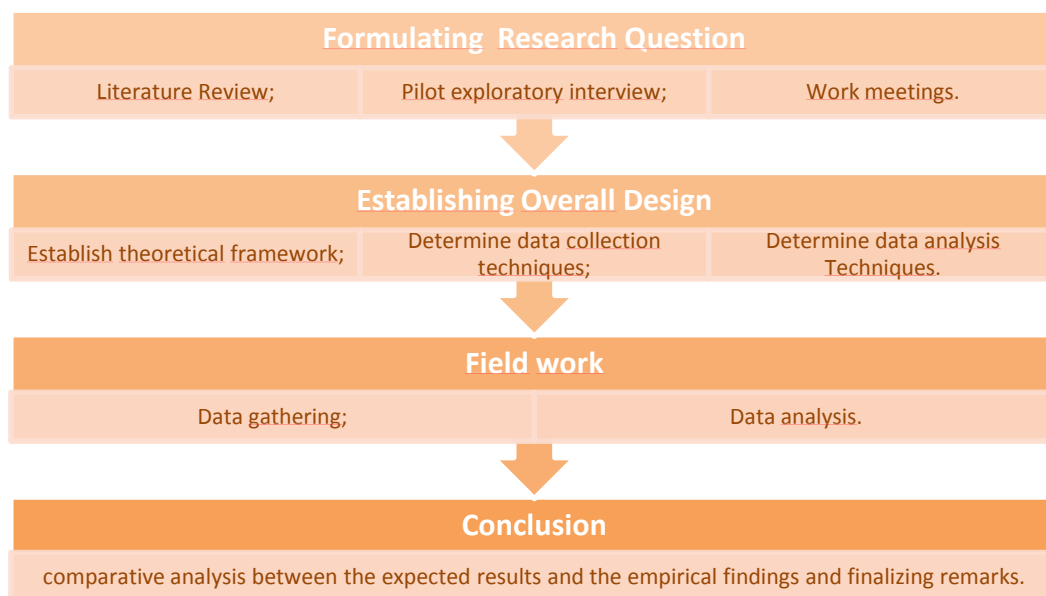


Figure 20 – Initial Pre-established Qualitative Design (own elaboration; Adapted from: Quivy and Campenhoudt as cited in Silva (nod).

This posture presents many advantages for an inexperienced researcher, allowing to obtain a more careful data collection (see Neuman, 2003). The researcher heads towards the field with various notions about the problem he or she is about to address, and a generic idea of what to look for and where to obtain it. The researcher has then, before hand a guideline (a raw version of a conceptual framework; an assortment of research questions and some vague awareness of sampling and data collecting techniques (see Miles and Huberman, 1994), making the job much easier. Besides this practical side, it also has propitiated approaching people’s perceptions with a sense of comprehension; authenticity and thoroughness, being devoid of preconception; sustained by reason; and substantiated by facts (see Quivy and Campenhoudt as cited in Silva nod.).

3.4.1 Formulating Research Question

In a first attempt, the goals of the investigation were expressed in the form of a research question: “What are the main social impacts (positive and negative externalities) of RES projects implementation, from a stakeholder’s perspective?”

Before obtaining the final version of the research question, it underwent several changes being progressively more accurate, shaped into an increasingly focused number of smaller questions, becoming more “specific; relevant and meaningful” to field work (see Rubin and Babbie 1997 and Hale and Astolfi, 2007). Which lead later along the research process to focus on “how are those social impacts being perceived by focal stakeholders?”

Quivy and Campenhoudt (as cited in Silva nod) and Rubin and Babbie (1997) have stipulated a few guidelines, that were taken into consideration to correctly elaborate questions during research process. According to this author, questions should be clear and unambiguous; precise and simply elaborated. This point of view is shared by Rubin and Babbie (1997), who also stipulated that questions asked should be relevant to most interviewees, and directed at subjects capable of answering them. Bias and judgmental questions potentially leading the interviewee to imposed answers, should be avoided (see Quivy and Campenhoudt (as cited in Silva nod); as well as question concatenation that by presenting “several elements offering possibility” of innumerable perceptions (see Rubin and Babbie 1997:194), may lead to conditioned answers. The cited authors pointed out, they should also reflect a realistic notion of the logistical aspect for implementation purposes, since most underlying feasibility issues have been associated to “time constraints; fiscal costs; lack of cooperation and ethical issues” being considered vital for planning purposes. Quivy and Campenhoudt (as cited in Silva nod) further serve the purpose of focusing on providing understanding about a situation (capturing the pros and cons, and eventual challenges), not only merely describing it. Ultimately the question presented should always reveal flexibility, in order to be changed during research; and readjusted, previous to field work.

To alter and readapt the research question rendering it more suitable, a literary review, a pilot exploratory interview and several work meetings were undertaken.

From the three classifications of information sources presented by Saunders et al. (2007): primary, secondary and tertiary, the most focused during this research were the first and second kind. These two sources, according to the same author, include reports (public or private nature); thesis; summary records from conferences (primary source); books and journals are some examples of secondary sources; the third source involves indexes; abstracts, dictionaries, and usually supply a link between other information sources. As the investigative process moves from using primary sources to third ones, some of the quality and detail is lost.

The assessment of social benefits or costs, in this project was firstly developed having as a baseline, a compilation of social impacts resulting from a literature review. It mainly worked as a theoretical guideline, a comparative measure of potential impacts that were a reflex of the community's expectations and concerns relating this issue, that could be (or not) identified on a practical basis (see Section 3.3). Because of interdependency between phases (see Rubin and Babbie, 1997) a successful completion of this stage has been seen as essential to move on to the next phases, formulating the questions and elaborating the interview guide, in short, it allowed to move on to field work itself.

The pilot study, where two semi-structured interviews were applied served to identify key issues, specific to the case study sitting, that weren't mentioned in previous literature review, and also to complement and compare them with topics already acknowledged. To Quivy and Campenhoudt (as cited in Silva nod), exploratory interviews don't have the function of verifying hypothesis, but to provide hints for reflection, to broaden and specify literature review, or help to become aware of different dimensions and aspects of the main problem, to which the investigator would have never arrived on its own; also avoiding the increasing interest for aspects that are not relevant or real, product of the researcher's preexisting notions (see Quivy and Campenhoudt (as cited in Silva nod)).

The application of these pilot interviews brought up another relevant aspect, the selection of the stakeholders group, which is closely connected to a key issue within the design strategy: the sampling matrix.

Saunders et al. (2007), has determined many types of sampling techniques, most of them derivative of three main kinds: random probability sampling; non-random probability sampling and mixed sampling. Even though, probability sampling has been considered the most used method for sampling in social research (see Rubin and Babbie, 1997), its application has not always been considered appropriate. In this research process, non - random probability sampling was selected, given that it takes into consideration resource availability while adapting to other important aspects of research such as the purpose of this study; or the research design adopted (focused moreover in greater detail). This has also been considered one of the most common sampling strategies used in qualitative research, where samples have been selected according to pre-established criteria (Mack, et al., 2005), relevant to the investigation question and objectives.

A non- probability sample design, assures that what is determinant to select people to be part of the study, is what the interviewee deems relevant regarding the subject matter, in contrast to their representativeness (Flick, as cited in Neuman, 2003). When compared with other types, this sort of sampling is less severe about size and quantity of subsamples, focusing on the above mentioned criteria, that identify participants giving an “approximate rather than a strict quota” (Mack; Woodsong; Macqueen; Guest and Namey, 2005:5).

Within the non-probability sampling, snowball sampling, has been considered the most appropriate for this study, in it potential elements to include in the sample are referred to the researcher (see Rubin and Babbie, 1997), allowing to gain access to groups that would have not been accessible through other sampling tactics (Hale and Astolfi, 2007). In the context of qualitative research it has not been necessary to collect data from an entire community, in order to achieve valid results; sample sizes vary depending on the availability of resources and time, as well as the aim of the study (Mack, et al., 2005). In this work the subset stays within the 6-10 elements interval, allowing to obtain a rich and profound textual input suitable with the researcher’s aim, compatible with

the high availability of resources, although associated to questionable representativeness.

3.4.2 Establishing Overall Design

After defining these aspects very early on, in the research process, the next step is establishing overall research design. Because theoretical background plays such an important role in developing a research design, a research model was developed based on previously analyzed representations (see Section 3.2). This integrated approach was chosen in spite of an already delineated strategy, because Saunders et al. (2007) and Neuman (2003) perceptions complement each other allowing together to better expose and establish a logic sequence to develop qualitative social research (see figure 21), providing support to develop a reasonable explanation to obtained results.

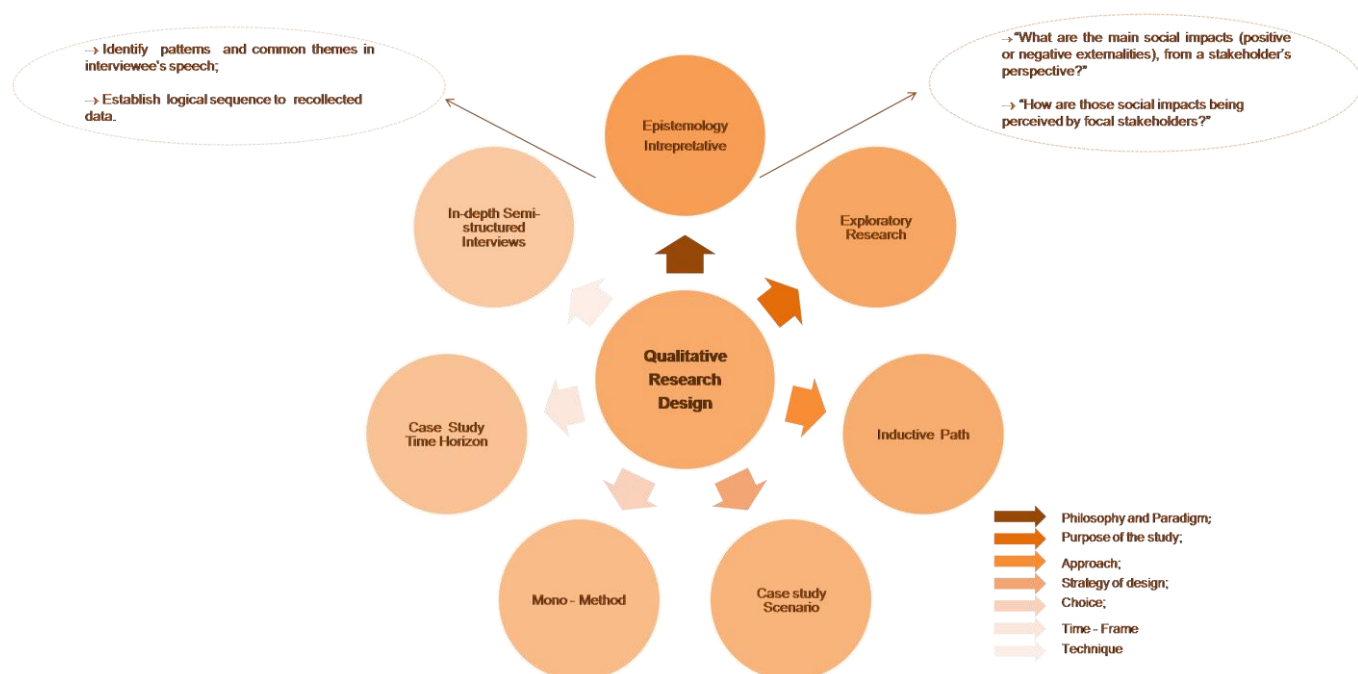


Figure 21- Qualitative Research Design (own elaboration; sources: Neuman (2003) and Saunders et al., (2007)).

Considering a broader and more abstract perspective, the current work embraced an epistemological view, in terms of its philosophical strand. The sequence that underlines this research investigation process, took into consideration all knowledge considered acceptable or what is valid within scope of a certain subject (see Saunders et al., 2007); being based in structuring data or knowledge (see Vieira, 2007). As for the “fundamental model” shaping the researcher’s perception (see Rubin and Babbie, 1997:37) or paradigm, an interpretative stance was adopted implying concerns over understanding and explaining what is happening (see Saunders et al., 2007). According to Neuman

(2003), this approach to social research serves the purpose of finding out what is relevant for the subject and how it is perceived. This theoretical framework is completely adequate and complementary of Neuman's (2003) dimension "purpose of the study" (see Table 6, Section 3.2), since it should be classified as an exploratory research due to novelty of studied theme. Further corroborating the positive integration of both models the abovementioned author stated that, interpretative approach has been seen as being useful in exploratory research, aiming foremost to value and describe significant social action, rather than testing theories.

By pursuing this approach, the objective was to gain depth knowledge about a subject matter, helping to build up relevant questions to conduct the research (see Raupp and Beuron, nod). This dimension has been useful to uncover new issues, or insights, as well as to make an introductory approach to a theme, that will be further developed in a posterior sequence of studies (see Neuman, 2003). Also, according to Raupp and Beuron, (nod), this has been considered a very important feature of this type research, proportionating a better perception of concepts, that have not been thoroughly explored previously, contributing to answer questions that were only explored in a superficial manner.

"Although social scientists observe people, they have been mainly interested in finding relationships that connect data" (see Rubin and Babbie 1997:56). This link between theory and practice has been established through two logical approaches: deductive or inductive (see Rubin and Babbie, 1997), meaning the logic sequence in which ideas or concepts are related to data differ (Neuman, 2003), constituting the main difference between qualitative and quantitative research (see figure 22).

While in quantitative methods favors a deductive "theory construction" where research is used to test a previously developed theoretical hypothesis, qualitative methods opts for an inductive route where "theories are developed through observation" i.e. from analysis of collected data (see Rubin and Babbie, 1997:54) focusing on widening and creating new ideas that dictate the course of data ensemble, establishing an interactive cycle (see Neuman, 2003).

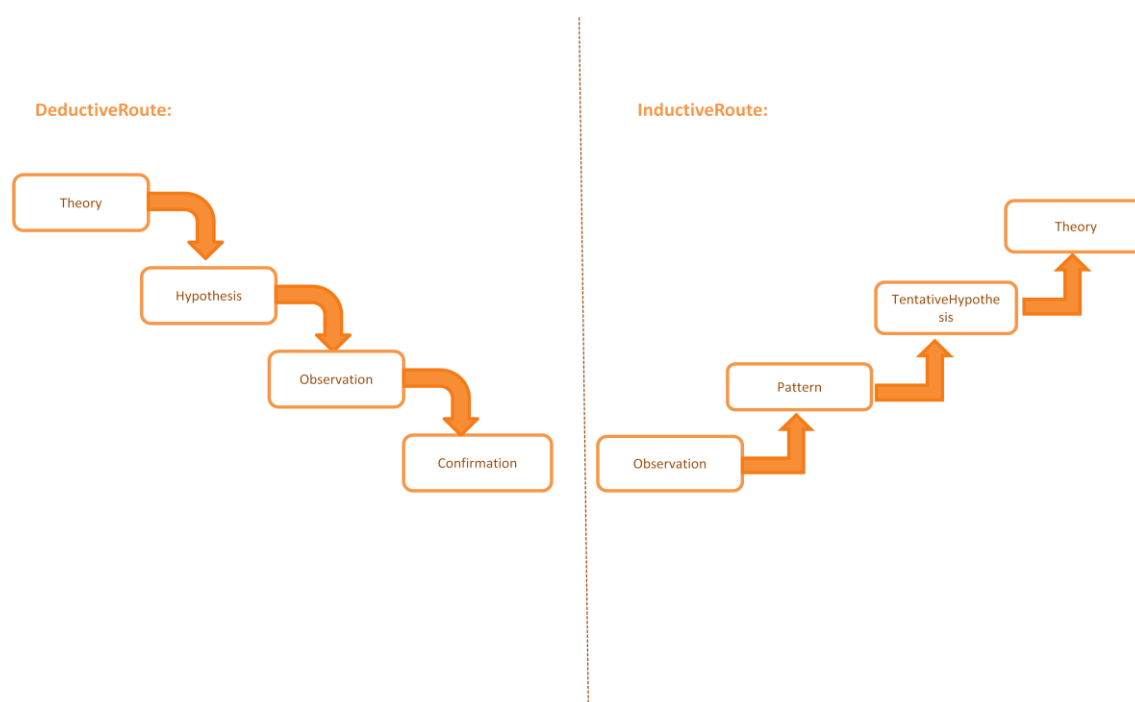


Figure 22- Quantitative and Qualitative measurement process (source: Santos, 2008).

Following the established logical sequence, committed to an interpretative approach, this work should be considered within the qualitative research field and therefore resorting to an inductive path i.e. developing a theory based on specific observations of social interaction, identifying patterns that lead to somewhat universal premises (see Rubin et al., 1997).

The next step focuses on designing a research strategy which will allow connecting the more abstract stages previously mentioned, to the more specific and practical aspects of research process, providing a logical sequence interrelating obtained results to “a studies initial question and ultimately to its conclusion” (see Yin, 2009:27).

A case study scenario was suggested because of the underlying need to understand “complex” and “contemporary social phenomena” (see Yin, 2009:2), showing consistency with both theoretical framework and purpose of investigation, constituting an exploratory case study.

Often the definition of this stage has consequences in the last phase of the research design (see figure 21), mainly because the strategy itself suggests specific methods for data collection, respecting established logics. This detail will further substantiate the choice of the proposed strategy, since it has been

reported that one of case study's traits is resorting to "multiple sources of evidence" (Yin as cited by Rubin and Babbie, 1997:402) some of which coinciding with proposed technique for data collection and consubstantiation ("interviews and existing documents").

Given that current investigation has been already established as a qualitative social inquiry, it resorts to mono-methods, featuring exclusively techniques within qualitative research; applied in a case-study time-frame contributing to achieve more detailed data in a limited timeline (see Neuman, 2003).

Regarding data collection techniques, this work relies on semi-structured in-depth interviews, which were seen as being consistent with the research nature and its main objectives. Field interviews have provided a manner of collecting experimental data about social phenomena by inquiring participants in attendance (see Silverman, 2004). Being the result from a cooperative effort between parts (interviewer and interviewee), engaged in a dialogue, differing from conventional friendly conversation (Neuman, 2003), but still seen as an interactive process. A known advantage for the use of such qualitative methods in "exploratory research" has been, according to Mack, et al., (2005) that by employing "open-ended" questions participants tend to "bring out rich and meaningful answers, that were not expected by the researcher"(p.2), in addition to gaining access to the participant's perspective; this advantage and that can be further enticed by resorting to probes.

To carry out the interview, the researcher developed an interview guide (see Annex I). This is the last element before field work. The elaboration of this specific interview guide, took into consideration King (2004) suggestions. Many different sources of information were taken into consideration, to be more precise: literature review; informal talks with several people with insightful knowledge on the area, as well as the researcher's own background, in order to elaborate a detailed listing of possible topics, which the interviewer exploits during the course of the meeting. According to the same authors, this should be seen as a flexible document, liable to modification, being reframed, refined and reformulated as the interviews unveil, allowing to add probes and approach brand new unsuspecting topics.

3.4.3 Field Work to Conclusion Stage

After a careful planning of the interview, and in order to provide a more comprehensive insight to what its application entails, a complementary strategy developed by Oliveira (2000) was contemplated (see figure 23).



Figure 23- Interview Planning Scheme. (Own elaboration, Adapted from Oliveira (2000)).

According to Oliveira (2000) and King (2004), attention should be paid to some aspects during the interview itself, and more specifically in the introductory phase. After proceeding to introduction the researcher should delineate the main objective of the work (what is expected to accomplish), and reassure the interviewee of the projects confidentiality, as well as for who it is being researched for. Permission to register the interview should also be obtained. The process of tape recording (as well as its transcriptions) has been seen as vital to ensure that the captured answers reflect not only what was said but also the way it was said (Given, 2008), helping to contextualize and provide an inclusive, whole account of the qualitative researcher's interests.

Other practical issues focus mainly on the relationship developed between the interviewer and the interviewee, that inevitably influences the course of the interview. As a dynamic process, where both parts interact, King (2004) stated that topics could arise without being pre-established in the interview guide; in

fact, issues could be brought up by participants, dispensing the need to probe (see King, 2004).

In field work stage, collecting data, is followed by data analysis, which connection to empirical observations in the proposed research design is very subtle but could be elucidated under inductive “logic reasoning” (see Rubin and Babbie, 1997). This same author rightfully suggested (as was later verified and adopted) these links could be perceived throughout the interview process for instance, by initially identifying similarities and divergences; pattern behaviors, their universal character (or not), as well as divergences in opinion. Miles and Huberman (1994), has seen data analysis as an activity with three branches: “a data reduction; data display and conclusion drawing/verification”(p.10); all three streams being interconnected and ongoing throughout data collection process. – as a continuous iterative activity (see Table 7).

Table 7-Data Analysis (source: Miles and Huberman, 1994):

Data Analysis

Data reduction	Practice of choosing; simplifying and altering textual data; allowing to to separate, precise, discard and organize data, in a way that conclusions could be drawn
Data display	Assemblage of information in a reachable format, that helps comprehending the current situation, and making necessary decisions
Conclusion Drawing/Verification	Final conclusions remarks only come together after data gathering is completed

Another crucial aspect required has been required the validation of the main conclusions. According to Miles and Huberman (1994), this procedure, may have many levels, from the simplest (researcher’s reflections while writing, posterior verification of field notes) to the more complex (conference and review with peers in order to obtain “inter - subjective consensus”).The meanings emerging have to be tested as to their reliability and rigor.

Cresswell as cited in Elsayedand Jones (2008:42), suggested concerning this issue an eight step tactic to test the research’s validity. The listing includes: ‘prolonged engagement and persistent observation in the field’; ‘triangulation’; ‘peer review or debriefing’; ‘refining hypotheses as the inquiry advances’; ‘clarifying researcher bias from the outset of the study’; ‘the researcher solicits participants’ views of the credibility of the findings and interpretations’; ‘rich and

thick description' and 'external audits'. From all of the referred steps at least four of them were undertaken - 'triangulation'; 'peer review or debriefing'; 'refining hypotheses as the inquiry advances' and 'rich and thick description'.

Saunders et al., (2007) and Yin, (2009), supported the idea of several types of triangulation. Contained by this classification is triangulation based on measures, that uses different metrics to evaluate a situation. For example, utilizing open and closed questions to assess knowledge about a certain topic; another type is associated with triangulation by observers, when developing an interview the presence of only one observer might limit data collection, while the attendance of more than one, might add different perspectives and contribute to diminish the limitation in data collection. This research was supervised by two professors who accompanied it, and discussed the obtained results at various work stages with the researcher, providing peer review or debriefing; 'refining hypotheses as the inquiry advances' was achieved by the development of a pilot interview as well as to work meetings; transcripts of information gathered during interview process were made accessible to the reader, for a possible credibility evaluation.

In order to proceed to a more complete analysis, it was necessary to address a fundamental aspect, related to data collection: data gaps.

Whilst the interviews were designed and carried out to propitiate the interviewee's collaboration, trying to obtain a detailed and contextualized perception, there were some issues (gaps) that should be taken into consideration. They were mainly related to the fact that the focused stakeholder's group represents a fraction of all stakeholders in the process, and that there was an overlap, because the interviewee was simultaneously a representative of the landowners and also a local resident, which sometimes implied a direct and indirect usufruct of the benefits associated with RES projects.

Gaps' concerning the differences between previously researched criteria, and observed results, were reduced by resorting to pilot interviews, that allowed an adjustment of content and a better coverage of the portrayed subject matter.

3.5 Concluding Remarks

In conclusion, social dimension can be assessed by resorting to quantitative or qualitative research methodologies. The main differences between the two sorts of data collection reside on the nature of relationships established. While quantitative approach only establishes general associations leading to broad scenarios, qualitative approach has the ability to capture information that otherwise would be omitted, making it appropriate to establish relationships at a local scale (see Del Rio and Burguillo, 2009b).

In order to conduct high-quality research, it has been considered imperative to stress the importance of a good theoretical frame (see Neuman, 2003), systematizing the researchers view on a certain subject, influencing the way research is conducted (see Rubin and Babbie, 1997). These global frameworks and perspectives that have allowed to systematize current qualitative research (see Lincoln and Guba, 2000) have underlined the preference for certain approaches; design strategies or procedures in order to achieve the researchers aim (see Neuman, 2003).

Although a multiplicity of patterns connecting these combined theories and research, have been portrayed (see Neuman, 2003; Saunders et al, 2007 and Crotty (as cited in Elsayed and Jones, 2008), the most relevant aspect, besides patent similarities and divergences, has been that despite chosen research design it should accomplish researcher's main objective (see Saunders, et al., 2007), of better understanding the purpose of human course of action (see Schwandt, 2000).

Undertaken literature review, illustrated focal points authors considered when addressing issues related to social dimension within RES projects.

Despite the global relevance of RES considering the actual socio-economic and political frame, the amount of studies concerning of this theme is scarce, especially when involving exclusively qualitative research methods.

Quantitative research methodologies seem to prevail in published literature, although increasing use of both qualitative and quantitative approach is envisaged. The implementation of such an option (mixed-method approach),

appears to be appropriate allowing to acquire new insights, complementing as well as corroborating previously gathered information.

Case studies appraised, although not exhaustive, were able to display most social aspects as being linked to public participation; employment generation; attribution of community funds and project ownership.

While several models and methods may be found in the literature, when social impact evaluation of energy projects or scenarios is foreseen participatory methodologies have been a common element, demonstrating the importance of public, stakeholders or experts involvement in the process (see Ribeiro et al. (2011); Del Rio and Burguillo, (2009b); Allan et al. (2011) and Rogers et al. (2008)).

Several case-studies (see Sastresa et al. (2010); Blanco and Rodrigues, (2009); Del Rio and Burguillo (2009b) and Cuartas and Menendez(2008)), stress the importance of job creation as a positive impact, increasing socio-economic welfare. Others (see Allan et al. (2011); Munday et al. (2011); Del Rio and Burguillo (2009b), have stated that benefits such as community funds and project ownership also played an important role in the improvement of social cohesion in isolated rural areas.

In order to promote sustainable and therefore successful power planning outcome, the appraisal of RES projects should take into consideration both positive and negative impacts, being addressed by local stakeholders, since “consent” has been closely related to a “balanced perception between impacts and benefits”(see SEAI, 2007h:60).

The abovementioned aspects and main methodologies used for social research in RES projects were taken into consideration, when developing an investigation strategy, based on a qualitative research approach.

In order to delineate the research process giving a “whole” perception (see Rubin and Babbie 1997:94), a research design was developed, supported on complementary models previously presented by Saunders et al., (2007) and Neuman (2003). The combination of these models allowed to reach an improved approach, featuring elements they lacked separately. This design allowed to

schematically portray the logical reasoning behind selected options framing the social research; connecting more abstract notions to increasingly more detailed aspects, establishing the bridge between empirical data, the research question right through its conclusion (see Yin, 2009). However, guidelines proposed by Quivy and Campenhoudt (as cited in Silva, nod) and Oliveira (2000) were undertaken because some aspects relating process, were not specified in the presented diagram. These unspecified aspects relate to the previous phases that usually lead to the formulation of the research question, as well as a detailed version of the steps implying qualitative data collection and analysis. Together all these cited authors provided insights that allowed to establish a logic connection between theory and research, influencing the valid reasoning behind inferred connections.

Chapter 4

Case Study

4.1 Background

The case study was developed in a rural area, located in the north region of Portugal; a region characterized by the high density of wind turbines (see figure 24).

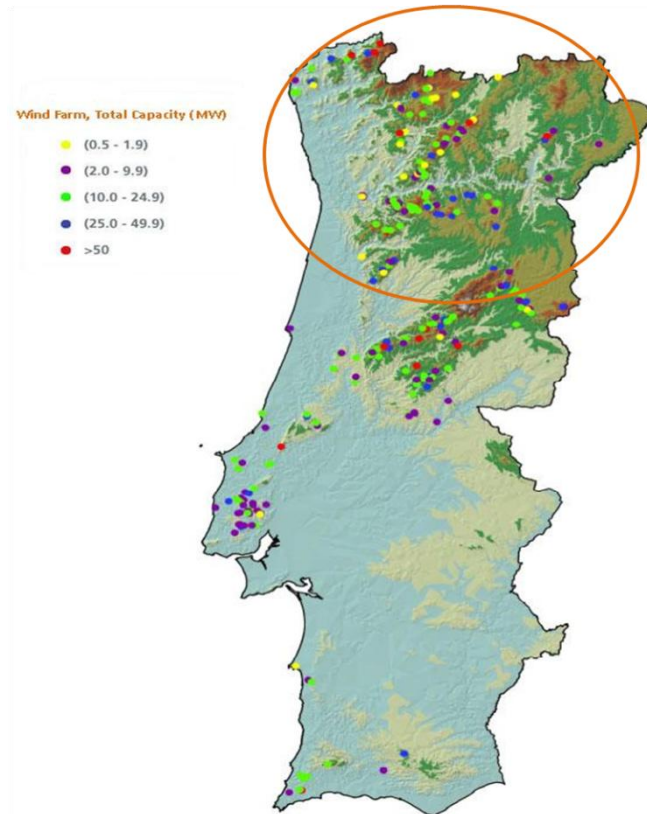


Figure 24- Case Study location area. (Source: adapted from INEGI and APREN, 2011).

This has been an area associated to wind power deployment since the late 1990's, and currently has a few projects in different stages of planning process, totalizing over 30 RES projects. Effectively Portugal has in recent years, invested in RES projects for a cleaner electricity production, backed up by national policies and legal framework. Figure 25 demonstrates the evolution of such investment, as far as wind energy is concerned.

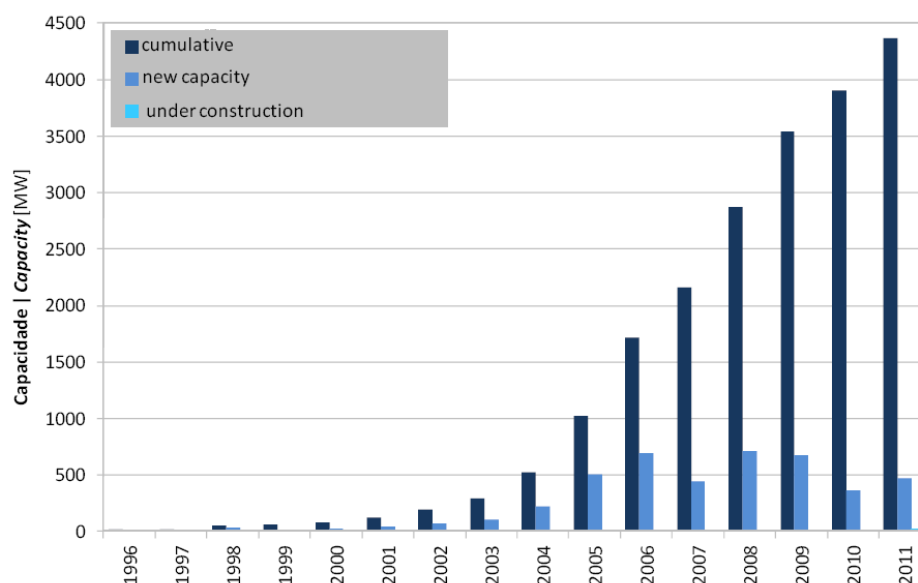


Figure 25- Recent evolution of cumulative generating capacity (MW) for wind energy (source: INEGI and APREN (2011)).

Therefore, ensuring the maintenance of such investment has been considered essential not only because it avoids significant costs with fossil fuel imports, as well as CO₂ emission permits, but it stimulates national economy in several domains, such as industry; job generation; equipment and services export; development of I&D projects and forest preservation, contributing to regional economies (APREN, 2012). In order to assess these potential socio-economic benefits at a regional and local scale, a case study was developed focusing a specific segment within stakeholder's universe. Because wind turbines have been or will be installed in communal ground, which management is delineated by legal resolution n° 68/93, implying the institution of Communal Land Commission Councils, selected research participants were representatives from these same Commissions. This focal group was considered ideal for exploring local impact from RES projects because they have been present throughout the entire negotiation process and, represented a link between other key players, namely RES promoters and local population. This approach is expected to allow recognizing what both parties brought to the table, despite not being able to interview all focal stakeholders. The main selection criteria underlying this specific case, lies on four premises:

- All elements of the focused stakeholder's group are members of the local community;

- Members of the Council Commission are elected by the community for representation; management and inspection purposes;
- They constitute a link between the local communities' interests, and the project's promoters;
- They have both direct and indirect benefits from RES projects implementation.

Although the high level of intricacy constituted a barrier to establish contact with promoters, this work still managed to contribute to developing a global picture regarding community benefits from RES project deployment. Since, the current legal framework established that 2,5% over total energy generation, income from a wind farm should be assigned to the local municipalities. However, other benefits derived from wind farm projects were also discussed with local community, namely with Communal Land Commission Council. Discussing with stakeholders this negotiation process directly contributes to answer proposed research questions, regarding what are the main impacts and how are they being perceived. Overall within stakeholders group, focused participants given their positions, and due to their responsibilities had a good knowledge of local reality, despite having different professional backgrounds. Most backgrounds ranged from three of the most preeminent local activities, such as construction workers, farmers or shepherds to engineers, accountants; bank account managers, contributing to diversified perceptions of wind energy deployment.

Further considering population characteristics, "target area" has an estimated average of 13.200 resident population, with focused villages having about 150 to 300 permanent local residents. Being a typical emigration area, population tends to increase during certain periods, especially during Summer time. This region could be described as having "disperse population" distribution, with a pronounced declining pattern due to above mentioned reason, as well as an increasing growth of elderly population. According to the latest statistic survey, Census 2011, National Statistics Institute (INE) (2012) the Portuguese aging population has increased circa 19% over the last decade, now reaching 2,023 million people. Of this universe the highest percentage (about 31%) of people

over the age of 65 is currently concentrated in the northern region of Portugal (see INE, 2012), coinciding with the selected study area. The cited characteristics, along with other factors such as the reliance on “agricultural subsidies” (see Del Rio and Burguillo, 2009b and Munday et al., 2011), or the “high unemployment rate” make these areas ideal for RES projects, since it can constitute an opportunity to reconvert local economies towards a more sustainable alternative, resorting to endogenous resources (see Munday et al., 2011). Such an investment could also potentially make a positive contribute to mitigate desertification in rural areas, once according to Directive 2001/77/EC (as cited in Del Rio and Burguillo, 2009b) it has been associated to local employment generation, contributing to increase social welfare.

As previously mentioned, traditionally this region has been known by its rural activities, now somewhat decayed, as happened to cattle grazing. This landscape is characterized by large mountain areas with granite nature, making them inappropriate for agricultural purposes, but ideal to explore wind energy to its full extent; contrary to valleys, where most residential areas have been located, being considered rich in fertile soil, supported by a dense hydrologic net.

Taking into consideration this context, seven interviews were undertaken, following the theoretical approach as described in Section 3.4 and the process may be summarized as:

- Literature review;
- Pilot interviews;
- Interview guide elaboration;
- Tape recorded interviews;
- Data analysis;
- Report elaboration.

4.2 Results

Regarding positive impacts stakeholder’s perceptions are till a certain extent, coincident with literature review undertaken. Most mentioned benefits are consistent with some of the identified categories for benefits schemes adopted by SEAI (2011h:60) and RenewableUK (2011) which included “community funds”; “benefits in kind”; “project ownership” or “local employment” (see checklist 1). Allowing comparison and potential corroboration of obtained results versus other developed works. Nonetheless, within stakeholder’s statements, different perspectives regarding social issues were encountered distinguishing them from previous studies.

Checklist 1– Most mentioned impacts within categories of community benefits schemes (own elaboration).

Category	Most mentioned impact	Interview Subjects						
		1	2	3	4	5	6	7
Community Funds	- Regular payment (annual rent)	*	*	*	*	*	*	*
Benefits in kind	- Accessibilities provision or improvement;	*	*	*	*	*	*	*
	- Social Equipments;	*	*	*	*	*	*	*
	- Facility enhancements (repair local buildings);			*	*			
	- Environmental improvements (reforestation);		*	*		*	*	*
	- Wood supply to Commission members;							*
	- Rental of local buildings;	*						
	- Invest in other commercial activities (tourism);			*	*	*		
	- Donations			*		*		*
Project Ownership	-	-	-	-	-	-	-	
Local Employment Direct:	- Local labor supply for construction phase;						*	
	- Local labor supply for operational phase.	*		*				
Indirect:	- Local labor supply for investment in social equipment;	*	*	*	*	*	*	
	- Local labor supply for investments in environmental improvement.			*				

Although additional revenue has been mentioned by a large majority of research participants as being the main advantage, the main contradictions with existing literature (see Munday et al., 2011 and Del Rio and Burgillo 2009b) have been associated to other categories. Benefits in kind, for instance reforestation and indirect employment generation seem to prevail over other types of community benefit schemes more evident in other studies (see Munday et al., 2011; RenewableUK, 2011; SEAI, 2011h; and Allen et al, 2011), such is the case of direct employment generation and project ownership. These results reflect combination of several factors, the existing legal framework that contextualizes, either allowing or restricting, different benefit possibilities; as well as balanced result between socio-economic characteristics of location siting, and interaction among different stakeholders in accordance with previous studies (see Del Rio and Burguillo, 2009b).

Despite such discrepancies, overall most participants viewed this investment as positive for local communities, registering both direct and indirect benefits (see figure 26).

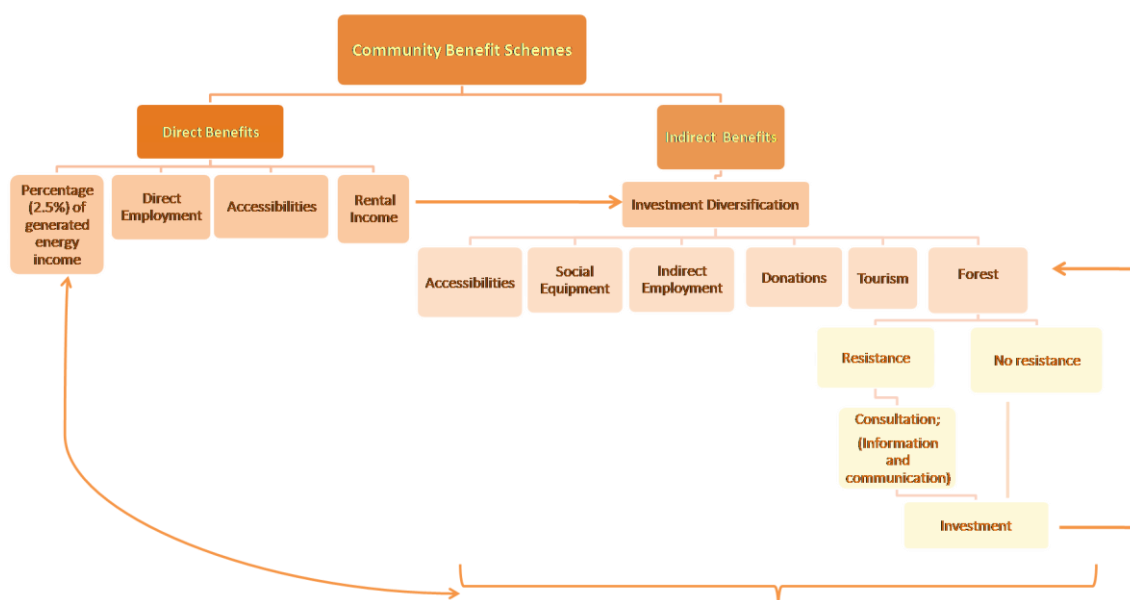


Figure 26– Main direct and indirect benefits attained by wind power deployment (own elaboration).

When approaching positive impacts, most mentioned aspects of benefits revolved around environmental issues, education background (or lack of it) and tourism and recreation (as future prospects). Although throughout the interviews

certain underlying themes were identified, mainly related to information accessibility and communication of knowledge that ultimately influence in a positive or negative way the negotiation process as well as the management process of attributed benefits. Relationships between local community's perceptions and acceptance of prospective investments were found, heightening the importance previously attributed to several aspects that sway public perception, namely "socio-economic"; "socio-political"; "local"; "personal" and "cultural" aspects as previously suggested by other studies (see Aitken, 2010a:1836). The complexity of such relationships was evidenced by obtained results regarding potential application of wind energy funds to forest resources, where respondents had conflicting views either willingly and consciously accepting this proposal or opposing it preventing its application. Such resistance (see figure 26) is a consequence of a combination of socio-economic and cultural background allied to misinformation and miscommunication issues, that as will be further discussed, implying negative aspects that cannot be dissociated from these benefits. Nonetheless, a positive outcome is still reached for local community (although not to its full extent or potential), as community funds always revert to local community. For instance, besides the available possibilities to re - invest granted benefits, the percentage attributed to local municipalities (2,5%) should always revert to local communities, being in many occasions used to suppress populations needs coinciding with most of indirect benefits (see figure 26).

The influence of lack of information and awareness should be viewed as a bad practice rather than a negative impact directly resulting from wind power deployment. Nonetheless, if this issue is not properly addressed, it can pose serious implications for environmental and socio-economic aspects, eventually leading to the generation of barriers to RES deployment; since in accordance with SEAI, (2011h) previous statement, public acceptance of wind farms by local community has been linked to the percept equilibrium between advantages and disadvantages. Favoring in this case suggestions to resort to an independent entity would also contribute, according to interviewee statements, to establish a missing connection between national and local authorities ensuring a more successful outcome to revenues, contemplating investment diversification. This

suggestion obtained from interviewee, has been validated by previous studies (see Rogers et al., 2008), since consultancy agencies, have also been previously focused in order to accompany negotiation process, ensuring advisement and support for local communities.

Advise from experts, in this specific case and considering the schematic view of obtained results, would contribute to influence community members more resistant to change towards a long-lasting investment with meaningful and valuable return, that more aware communities are already anticipating. Furthermore, the mention by interviewees of the need to establish a link between national and local authorities has been considered focal and very accurate, as other authors (see Allen et al., 2012) have mentioned it as being vital to implement RES projects at a local scale.

As a future prospect, in order to determine the appropriateness of prospective alternatives, a cause – effect diagram should be developed (see figure 27), identifying potential incentives and barriers that should be taken into consideration by local authorities and commission councils, effectively helping to overcome many of the registered difficulties regarding unawareness and resistance to potential opportunities of investment associated to wind farm deployment. Giving simultaneously a global idea of which factors inhibit or incentive its deployment, helping to strategically plan the most sustainable alternatives, comparatively to other theoretically available options. Alternatives that were not mentioned by interviewees but due to initial literature review constitute relevant items to take into consideration while analyzing wind farm deployment, have been identified in cause-effect diagram. However, most mentioned options, have been focused previously by other authors, such is the case of desertification issues or misinformation and miscommunication issues. Despite this, by incorporating interviewees perceptions, these topics have been adjusted to this case study reflecting the logic or reasoning behind opposing perceptions, revealing that overall interviewees had a much more detailed vision of RES investment framed by their experience and knowledge of local traits, yet still connected to issues with global relevance.

Taking into consideration these aspects, figure 27, illustrated the large spectrum of topics focused during interviews and the variety of issues for each dimension in order to achieve a more strategic approach to planning process.

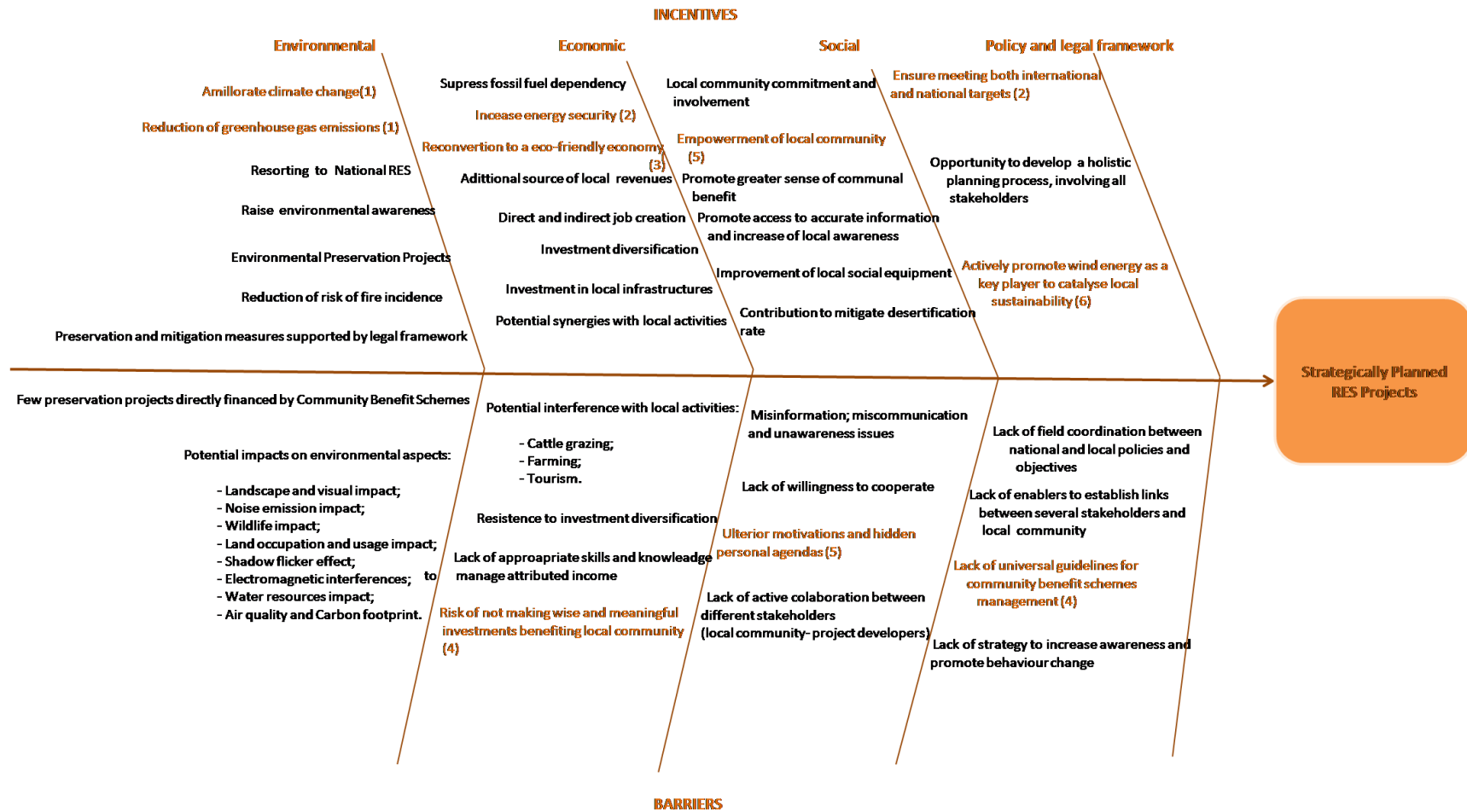


Figure 27- Cause – Effect Diagram identifying potential incentives and barriers for “Community based Renewable Energy” (CRE) Projects (own elaboration, adapted from Allen et al., (2012). Sources: (1) Saidur et al., (2011); (2) DGEG (2012); (3) Munday et al., (2011); (4) Aitken, (2010b); (5) Allen et al., (2012) ; (6) Del Rio and Burguillo, (2009b).

Regarding negative impacts, it is interesting to underline that all participants in the interview processes claim that none of the represented commissions ever received complaints regarding negative impacts from wind energy parks. Despite this, stakeholders did have many concerns regarding environmental, social and economic aspects (see checklist 2), that were approached during negotiation process with project developers.

Checklist 2– Main referenced concerns with adverse impacts perceived by research participants (own elaboration).

Category	Main Referenced Concerns						
	Interview Subjects						
	1	2	3	4	5	6	7
Landscape and visual impact	*	*	*	*	*	*	*
Noise emission impact	*	*	*	*	*	*	*
Wildlife impact	*	*	*	*	*	*	*
Land occupation and usage impact	*	*	*	*	*	*	*
Shadow flicker effect	*	*	*	*	*	*	*
Electromagnetic interferences	*	*	*	*	*	*	*
Socio-economic impacts:							
- Property value;	*	*	*	*	*	*	*
- Cattle grazing;	*	*	*	*	*	*	*
- Farming;	*	*	*	*	*	*	*
- Tourism.	*	*	*	*	*	*	*
Water resources impact	*	*	*	*	*	*	*
Air quality	*	*	*	*	*	*	*
Carbon footprint	-	-	-	-	-	-	-
- No information available; *No impact;	* Impact, not negatively perceived; *Impact negatively perceived.						

Here similarly to what was verified with community benefits, there has been divergence in obtained answers reflecting to some extent a problem with incomplete knowledge and also the recognition by research participants that benefits have a significant weight against potential negative impacts, which

inevitably conditions its perceptions. Once again, the lack of accurate information regarding impacts associated to this sort of investment, preventing a pondered decision over RES projects could backfire, becoming an obstacle for future RES deployment. Most of the negative impacts described in Section 2.4 were either not verified or verified but not negatively perceived in this case study. For instance visual impact was according to some interviewees not verified due to wind farm location and substantial distance to residential areas or verified but not negatively perceived. Research participants also showed interest and concern over some aspects, namely impact on local economic activities; noise emissions and land occupation and usage (see checklist 2) reflecting either a less positive experience for the first two examples or knowledge of existence and notion of extent of potential impact in the third case. However the main drawback has been associated to the gap within local community members, that similarly to the gap mentioned by other authors (see Aitken, 2010b) between local community and project developers eventually leads to mistrust, negatively affecting local relationships and perceptions regarding RES.

Regarding future prospects and sustainability issues, although the issue of local desertification seems to be dependent of future events, therefore not easily predictable, comparatively to previous studies (see Del Rio and Burguillo, 2009b), and largely due to the effort developed by commission councils, the tendency followed by benefit investments favoring diversification has been helpful to reconvert local rural economy, since indirectly opportunities are being developed to contribute to create attractive conditions to settle young population in the region. However, as registered in other aspects focused in this case study, opinions seem to be divided, with other interviewees considering wind farms as being isolated investments, with needs regarding employment generation, considered essential to attract population to rural areas, as being very limited in time, associated to its construction phase.

4.3 Discussion

- *Community Benefit Schemes*

Community Benefit Funds

Results obtained show that for a majority of focal stakeholders, the main direct benefit was received income. When asked about main benefits, all interviewees reported community benefit funds as the first positive outcome for their villages, along with some benefits in kind, mainly providing or improving access roads. Checklist's 1 distribution of obtained answers accordingly to established criteria, reflects this tendency, similar to Rogers et. al., (2008) findings regarding community's benefit expectations. According to this author, hosting communities expected RES projects to increase their "social sustainability", especially regarding direct benefits and improvement of quality of life (see Rogers et al., 2008:4241). The abovementioned results are further demonstrated by interviewees 1 and 2 quotes:

"The main advantage for us is the financial benefit, that is a compensation they give us resulting from the usage of land (baldios). Then we also have infrastructure improvement, since to access wind farm location, developers have to provide accessibilities, which is also reflected as a positive outcome for local community." (Interviewee 2);

"There is a regular payment per installed capacity, which is a yearly direct benefit. Then we have indirect benefits, and that is the case of road repairs." (Interviewee 1)

These statements coincide with what is considered to be one of the most common aspects of socioeconomic impacts regarding wind energy schemes – community benefit funds, focused in previous chapters of this research. According to Munday et al., (2011) it has become increasingly more usual for promoters to resort to such schemes, in order to invest in local communities. This has been brought up by interviewee 1:

"...income resulting from leasing location site, is being channeled towards social equipments." (Interviewee 1)

Investments have been focused mainly towards day care centers for elderly people, reflecting a recurrent theme mentioned by research participants associated to increased aging of local communities. The perspective of answering local population's needs by implementing communal projects is what interviewees found to be most enthusiastic. Interviewees 3 and 5 expressed it better when they said:

"(...) our biggest benefit was on a financial level, because it allowed to invest in new infrastructures and to improve others already existing. Before this would not be possible because we lacked income. These are remote areas, that do not have that sort of funds." (Interviewee 5);

"(...) these direct benefits are an advantage, because these are communities virtually without income, and now we have a way to develop them through wind energy. (...) Local population is rejoiced because now we can do something, that otherwise seemed impossible." (Interviewee 3)

The abovementioned extracts reflect that these benefit provisions can make a successful contribution in improving quality of life of secluded communities. Therefore achieving as other studies pointed out (see SEAI, 2011h), its main goal of engaging host community members in RES profits. The extent of the potential impact of these projects in both social and economic dimension is adequately described by interviewees 5 and 6:

"(...) Here the little income we had was from the forest, there was no other source of income. We were talking about a yearly sum around 2 to 3 thousand euros, and now we are talking about 40 to 50 thousand. It is a very big difference." (Interviewee 5)

"(...) I cannot really tell you about people's expectations, but what I can tell you is that income from wind park has made a decisive contribution to improve quality of life of local populations. (...)" (Interviewee 6)

These obtained statements have been further corroborated by Del Rio and Burguillo's (2009b) suggestion, that RES projects might make a considerable contribution to local sustainability of rural areas.

- *Benefits in kind, local employment and project ownership*

When discussing RES benefits, an interesting result that contradicts what was expected from other case-studies (see Munday et al., 2011) is related to the part benefits in kind play in contributing to benefit local communities. All inquired participants, from different villages, mentioned the existence of this potential benefit making it quite usual, contrary to Munday et al., (2011) views that considered its input as “relatively rare”. Besides facilitating access to the wind farm itself or within local community, it must be highlighted that most stakeholders believe accessibilities have been a very important contribution to fire fighting. This is one of the reasons that Interviewee 3 claims to have influenced the extent of burned area, much minor than previous years, despite high number of larcenies registered:

“(...) the tracks opened on the mountain, have been made more to fight fires (...)” “Which turn the combat much faster, because fire fighters have the ability to reach the burning area, which otherwise would have been impossible.”
(Interviewee 3)

Regarding other forms of benefit schemes portrayed in checklist 1, “project ownership” has not been verified due to national legislation and policy context; even though Interviewee 3 evoked another benefit scheme predicted in the national legal frame, consisting on supplying to local municipalities a percentage (estimated around 2.5%) of generated energy profit *“to be invested in developing this rural area”* (Interviewee 3). This distribution of income has also been applied in other European cases, allowing local authorities to invest in “local projects” comprising environmental, economic and social aspects (see SEAI, 2011h).

Participants were fairly divided concerning local employment, where only a minority of answers focused direct employment of a temporary nature during both construction and operational phases. For the most part of the stakeholders, employment generation has been associated to the way generated income is managed and redirected towards other investments, i.e. it has an indirect nature. These findings reflect the controversial nature of this issue, since most studies have dealt with it from a very global perspective,

estimating that the contribution of RES projects to direct employment is significant (see Blanco and Rodrigues 2009), although not fully representative of this aspect in all of its dimensions (particularly on a local scale).

Overall, despite this not being a consensual issue amongst interview subjects, data collected showed that community funds and benefits in kind had a larger extent, being verified in more subjects than direct employment, therefore suggesting a different weight from existing literature. Nonetheless, results also reflected that indirectly generated employment should be emphasized, demonstrating a wide level of implementation contributing to local welfare, contradicting Del Rio and Burguillo, (2009b) findings, predicting enduring indirect jobs were probably very scarce. For example, according to Interviewee 5 *“(...) we are now in the implementation phase of day center project. We think that within a year construction will start, and of course all of this is because of income we will receive over a 25 year period of time.(...)We are also thinking, that the day center should serve meals, and for the cooking staff, we will give preference to local candidates.”* (Interviewee 5). Interviewee 2 also gave an example of a nearby village that was very much undeveloped, and due to wind park implementation has now a retirement home that employed a total of about 18 people, making a substantial difference in an isolated rural area with social issues, namely aging and emigration of population as well as employment prospects as described in Section 4.1.

Although collectively, research participants were consensual about the main sorts of community benefits verified, commission representatives indicated different perspectives regarding diversification of investments resulting from fund attributions. Based on obtained results, interviewee's insights featured a large spectrum of themes encompassing environmental, social and economic aspects, reinforcing Allen's et al. (2012) perception about the uniqueness of each community and location. Most mentioned aspects revolved around environmental issues, education background (or lack of it) and tourism and recreation (as future prospects). In obtained statements, many aspects were interrelated sharing underlying common factors, like access to prompt accurate information, that influences the positive outcome of the process making it slightly less exuberant than its real potential, reflecting Ribeiro et al., (2011)

perception of social dimension as being complex and multifaceted. Comparatively, though these findings reflect a common ground of concerns amongst stakeholders, interviewee points of view were often inconsistent with other researches featuring RES project opportunities. For instance, it has been previously established that community funds main investments fall on communal social equipments; education and qualification skills, as well as energy efficiency measures (see Munday et al., 2011), with the exception of investment in infrastructures of social nature this does not reflect interviewed subject's perceptions.

Perceived Educational Impact

Educational aspect can be approached in two separate ways, featuring either an informative basis or a more enduring path focusing on qualification and training skills (see Del Rio and Burguillo, 2009b and Munday et al., 2011). Contrary to obtained results, both cited authors believe wind energy has had a positive impact on this aspect. Furthermore Munday et al., (2011) considered it a relevant contribution to attract more benefits to local economy, potentially favoring recruitment of local workers. In the few interviews where operating or maintenance jobs were mentioned, there was no previous training of the contracted workforce. As was made clear by Interviewee 1:

“Construction work required specifically skilled technicians, therefore the staff was not local, but during maintenance they resorted to local workers. There was no investment in any training programs for local population, but people with qualifications in a certain area were recruited. I know about, at least two cases of man that are currently working due to their previous knowledge in electricity field.” (Interviewee 1)

Overall interviewee opinions also oppose measures widely adopted in previous studies (see Del Rio et al., (2009); RenewablesUK (2011) and SEAI (2011)) that encourage and support projects focusing on environmental education and development of tutorial programs concerning RES topics, simultaneously recognizing the potential of wind farm facilities in becoming “interpretative centers” (Department of the Environment, Heritage and Local Government,

nod:15). When confronted with these options, Interviewees 1 and 2 considered that currently no investment has been made concerning educational purposes:

“There was no investment made in that area.”(Interviewee 1); “At this moment none of those options is available, nor there are any future perspectives of happening.” (Interviewee 2)

Further, Interviewee 1 denoted some skepticism as to environmental education centers being in this case, the appropriate option to raise public awareness. Evidencing this is not a straightforward matter, with a wide range of approaches available in order to reach public perceptions. Moreover, in the context of diversified forest investment, Interviewee 1 suggested the use of a different strategy for this purpose *“(…) People have to feel motivated to preserve and invest in this resource and only after that, they have profit, meanwhile there is a lot of work to develop in order to raise awareness step by step, presenting and visiting other examples that have been successful for instance. And that is what we are trying to do at this moment.” (Interviewee 1)*

This attitude increases the likelihood of engaging local communities by developing diversified approaches to raise consciousness about several types of RES projects and possibilities of involvement similarly to Rogers et al., (2008) case study.

Perceived Environmental Enhancements

According to what was exposed in Chapter 2.4 environmental concerns have been also considered a key issue triggering important social reactions, making them an element to take into consideration considering wind energy deployment.

Despite in previous studies (Rogers et al., (2008); Del Rio and Burguillo, (2009b); Katsaprakais, (2012); Saidur et al., (2011) and Leung and Yuan (2012)), environmental benefits being looked at from a broader perspective, and especially in comparison with more conventional energy sources, in this case interviewees seem to be aware of the connection and contribution of local wind energy projects to global sustainability issues, similarly to Rogers et al., (2008) findings. Since, when asked why should these sort of projects be installed in

their region, besides the unanimous answer regarding local advantages, some representatives identified reasons beyond local community scope, reflecting some of the main principles focused in national policies for energy sector, such as resorting endogenous RES for electricity production, reducing external dependency. The motivations here expressed by several interviewees go in line with the trend of “localism”, previously expressed by Allen et al., (2012), that envisaged community RES projects as a tool that stimulates the use of “local services and resources” complementing local and global efforts in order to achieve sustainable development. Interviewees 3, 4 and 5 articulated the following ideas:

“It brought many local benefits. But why are we buying energy to foreign countries, when we can produce it here? Here we are using what is ours. We are taking advantage and using our own resources.” (Interviewee 3)

“Most advantages are related to accessibilities, we had poor roads to access the forest, the other main reason is the income (...). Up until now, nothing points to pollution emission issues, or other type of inconvenient, so therefore we have nothing against it.” (Interviewee 4)

“I think I speak in name of all my village, we all think that just the fact of having this sort of project here implemented, is an innovation that can bring many benefits for local population, in general. We always think about energy consumption and its affordability; we hope that in the future there will be improvements in this area. This can also be one of the reasons that made people regard these investments as a good initiative. Another reason, is the fact that we are not so dependent on other countries or other energies. Then of course the biggest advantage locally is without a doubt the income and improvements, because probably if we did not have here wind farms, we would never have access to this amount of money, and would not be able to improve accessibilities and other infrastructures.” (Interviewee 5)

Regarding potential environmental implications of wind farms, ecological impacts seem to prevail, focusing on topics such as flora and fauna preservation, as well as the forest. This is quite relevant since most of these wind energy schemes are located in what are considered relevant areas for

wildlife conservation (specifically breeding areas and feeding corridors for the Iberian wolf (*canis lupus signatus*), along with temperate wet heaths habitats. Although conscious of the presence of species and habitats that require special protection, most participants relied on measures provided by existing legislation for preservation purposes, instead of applying benefits decurrent from wind power schemes. For example, Interviewees 1 and 2 stated “(...) *In accordance to what is stipulated in national legislation, Environmental Impact Assessment (EIA) predicts elaboration of monitoring plans for some species.*”, and “(...) *No diligences were taken by the commission regarding this issue, leaving it to accountable authorities (Ministry of Agriculture or Environment) to apply legal framework.*” Another interviewee declared, along the same lines, that although the commission was not directly involved, preservation measures were taken, attesting authorities’ active engagement: “*Although we did not have access to the final report, we are aware that measures were taken. During meetings with local authorities, to approve accessibility alternatives, an authority representative for species preservation was present.*” (Interviewee 4)

Although not reflecting other cited examples that promote habitat preservation (see RenewableUK, 2011), the quoted statements inadvertently brought up attention to the important role tools required by law play in local stakeholders perceptions, emphasizing an idea focused in previous chapters, the importance of undertaking an EIA process. Reinforcing SEAI’s, (2011f) suggestion that proposals and authorities responsible for planning processes should feature, prior to implementation of wind farms, a thorough EIA process to determine potential impacts on biodiversity. Abovementioned interviewee’s statements also corroborated the same author’s claims that most activities developed (especially during construction phase) potentiating “short, medium and long-term impacts” that require the application of precautionary measures. This acknowledgement has also been verified by Miranda’s (2007) comparison of several Portuguese EIA processes.

Nonetheless, a more proactive attitude was registered in this context, even though still not resulting from direct investment of obtained revenues. The protocol established between local authorities, landowners commission and national environmental association QUERCUS, aiming as this non-

governmental organization stated to promote preservation of biodiversity specific to mountain habitats, actively involving local stakeholders in its management, since it has been considered strongly connected to traditional local activities, namely livestock grazing (see QUERCUS, 2012).

This project represents a positive step towards an increased involvement of local community with the project as well as an important contribution to preserving local natural heritage while developing ways to overcome and mitigate undesirable effects that could otherwise eventually lead to project barriers. According to Interviewee 1, *“(..). As the wind park will affect an area of mountain shrublands, the commission, demonstrated its concern and alerted the project promoter to take that fact into consideration during certain activities throughout construction phase. For instance, to avoid water drainage during excavation of conduits for cables connecting different turbines. The ditches have to be covered as soon as possible to avoid the increase of soil drainage, to avoid them from losing water, since this is considered a wetland habitat. This habitat is currently being submitted to an environmental protection program (HIGRO), in collaboration with environmental association QUERCUS.”*

Interviewee 5 also mentioned a valuable insight, referring that *“local community would not know till what extent to opine about this subject, since their wind farm location does not affect vulnerable species, like other cases.”* Underlying issues of communication, knowledge and awareness can sometimes end up restricting public involvement as heightened by this example, denoting what Rogers et al., (2008) singled out, that sometimes participatory approach in RES projects is partly affected by people lacking experience and access to expert knowledge.

Within perceived environmental enhancements, research participants also recognized the forest as another critical theme for their community. Although the improvement of accessibilities reducing the risk of fires has been widely regarded as an asset, the initial foreseen prospect of a broader level of support and openness towards the idea of endorsing forest resources was below expected, due to registered divergences (see figure 26).

Within community members some discrepancies were registered, dividing stakeholders into two distinct factions, with somewhat opposing insights.

Polarization arose while discussing diversification opportunities that these projects could provide. Some felt that local population was not sufficiently cognizant of the advantages brought by forest investment, being usually associated with resistance to forest restoration; on the other hand, those who felt that local population was aware of benefits associated to forest investment, tended to accept reforestation. Such contrasting results could be linked to cultural background as well as knowledge and awareness issues.

Local community is characterized by being a rural economy, supported by traditional agricultural activities, such as livestock breeding activities, and to a less extent forest activities. In this context there seems to be a link between the nature of the investment and the established relationship with the forest. The predominance of one utilization over another might influence (motivating or dissuading) people's response to make an investment in this resource. According to Interviewees 1 and 6 it has been quite challenging for some community members to accept reforestation, since grazing is a very ancient and typical activity. Within the group less supportive of projects that stimulate forest rehabilitation and its by-products, the abovementioned motivation was considered pivotal. However, another interesting fact for this attitude was given, suggesting a deeper reason for this lack of support and drive to revitalize this local resource. Still according to Interviewee 1, history played a major role in the current state of mind *"(...) We have a rural economy, and we have to make it profitable. But people are not aware of that. Before 1940's the management of this common land was directly made by local villages, and everybody raised cattle, my family alone had a herd of about 400 animals (200 goats and 200 sheep), back then the government forced local population to sell their livestock and forested pasture areas . With implementation of democracy in 1974, there was a denial towards the forest, with people setting fire to previously forested areas. Regarding this issue, there is a negative rapport between local communities and communal land, and the sensation that there is still an injury that has not healed. People have to feel motivated to preserve and invest in this resource and only after that, they will have profit, meanwhile there is a lot of work to develop in order to raise awareness (...)." (Interviewee 1)*

In spite of recognizing that some difficulties could posteriorly be faced, Interviewee 6 expressed that some of the profits have been re-invested for reforestation purposes that eventually might potentiate synergies with other local activities. If this is accomplished, this RES project will be contributing to further incorporate wind energy in local economy, since it will provide an additional benefit besides initial income, being adjusted and complementary of local resources and activities therefore reinforcing local sustainability. This potential positive contribution defies results obtained by Del Rio and Burguillo, (2009b) that considered wind farms as having performed a restricted contribution to local economic scenario.

“Some of the benefits were channeled to reforestation. For example, thousands of chestnut trees were planted, in a characteristic area, where a grove of chestnut trees had recently been burned down. We shall see what the future holds and, if in the future, other wildfires do not end up burning everything down. The reforestation was done resorting to chestnut trees, and there is in nearby surrounding areas a chestnut transformation industry, but once again it is not certain that this project will flourish also because sometimes people do not respect reforested areas and let their livestock graze everywhere.”
(Interviewee 6)

In other cases, where communities were more aware and forest driven, acceptance and acknowledgment of forest investment was more prevalent. Respondents recognized that due to past activities, villagers were more alert to the importance and significance of the forest. This is the case of Interviewees 2 and 5 *“(…) People in my village are highly conscious of forest related issues, since most of them worked precisely in the forest. Back then there was what they called the arboretum, a forest house, and about 80% of the village population worked there, from a very young age (14-15 years old) they had to leave school and work, also dedicating themselves to raising cattle. Therefore, for them a tree is like an asset.”* (Interviewee 2)

Besides past motivations, attention was also brought to the role that nowadays commission's assembly meetings play. Where according to Interviewee 5 when an important decision such as reforestation is about to take place, all the

aspects of the investment are discussed taking into consideration and engaging local's insight, actively contributing towards awareness *"(...) when we were about to decide which part of the land to reforest, analyzing what were the benefits, which parts should we pursue and had the best accessibilities, it was decided back then to reforest only a fraction, because otherwise it would have been not sustainable, because of livestock grazing. But people are aware and sensitive to that issue, and the more trees they see the better, but we are still waiting the funding approval."* (Interviewee 5)

The combination of aspects, on one side the fresh memory of a rural community based on forest resources, and on the other the recognized effort develop by the local communal land commission seem to heighten the divergent attitudes observed between both groups. For a non resistant public segment (more susceptible to forest issues) direct investment in the forest is ensured by contract, despite the present law for common land management stipulating only a non-specified amount of benefits should directly revert to communal land investment known as *baldios*.

"It is predicted in legal framework that regulates the management of common land that part of the income reverts in favor of local communities and land resources. In our case, our contract specifically stated that money had to be re-invested in period of 5 years, and if I am not mistaken about 20-30% had to be spent in reforestation. We are also studying the prospect with our local forest association the possibility of applying to European funding, that covers about 80-85% of initial investment." (Interviewee 2)

"In the case of our directive board, it is certain that at least 50% of income will be invested in the forest, because we need it, with previous authorization of commission members, of course." (Interviewee 3)

For a more skeptical public segment, this does not seem to be sufficient to guarantee that investment diversification is applied in forest resources, due to such a vague notion of investment referenced by actual legal framework. According to interviewee 1, there is a void concerning this issue, and in order to ensure managing authorities are committed to it, an independent and external entity should accompany the entire negotiation process performing consultancy

duties near local communities. This opinion has been consubstantiated by previous authors (see Rogers et al., 2008) indicating how beneficial providing expert assistance could be to further increase RES projects while promoting participatory approach.

“There seems to be a void between national policies and authorities and local management authorities. The government is completely distanced from rural communities and local municipalities currently have very low budgets and increasingly more chores, it seem to me that they will not take that initiative on their own. So, this existing void must be addressed, there is that need that was mentioned by you (the interviewer) for some entity, besides the government, to ensure a certain percentage is directly applied to the forest. It is proving difficult for them to guarantee that management entities are held responsible for investing income in the forest. It is urgent, and I think we are walking in that direction. But it will be a difficult task to change mentalities (...).” (Interviewee 1)

This statement also brought up another relevant aspect regarding the coordination between national instituted policies, that outline the governmental strategy to reach national targets and local governance that implements measures in order to comply with pledged compromises. Such observations support the idea that the effort to apply a thriving community benefit scheme cannot be unilateral, regardless of the will to participate, improvement of local welfare requires as suggested by Interviewee 1, the support of both national and local authorities as well as the cooperation community and promoters representatives to ensure that money is being wisely administered, and not being idly spent. Such concerns have also been previously identified in earlier literature review (see Aitken, 2010b and SEAI, 2011h), recognizing the importance manifested in interviewee’s 1 statement of involving all parties towards a positive and more sustainable outcome.

When further comparing noted discrepancies regarding forest investment, another relevant element might be exposed, constituting a key issue common to both groups. Interviewee 3 focused the need to address pre-established perceptions, in order to elucidate local population towards benefits and disadvantages.

This concern of raising awareness attempting to deal with public perception was also very highlighted among subjects less prone to accept forest investment. But while Interviewee 3 exposed a successful effort in this area, the first commission representative (Interviewee 1) illustrated how challenging and yet necessary it is to manage this situation. Similarly SEAI (2011m), simultaneously drew attention to how essential yet complex and enduring this process of demystifying while understanding and embracing public's legitimate apprehension is. Both of registered opinions reflect precisely the need to ensure stakeholders access to accurate information in order to make up their minds, and therefore deliberate about prospective opportunities.

"(...) But it will be a difficult task to change mentalities. (...) Currently people only think about short term investment, they don't have the perspective of long term investment, and I am referring to forest investment. People haven't seen yet the forest as an asset, or maybe as one of the biggest sources to generate profit and richness. Nowadays people view investment as applying revenues in local improvements (social equipment or accessibilities), that in my opinion will not have a return profit as interesting as the forest. I really think the secret here is to re-invest in the forest and people have not got that sensibility yet, so they do not see it as an objective, they do not make the proposal and do not vote for it. A lot of work needs to be done in order to raise awareness and motivate people to invest in the forest as a way to provide income, because this resource generates a lot of direct and indirect benefits. Besides biodiversity and other environmental issues, the forest creates many local jobs in several areas, such as tree resin; wood; mushrooms; honey, therefore it's an asset that local population should take advantage of." (Interviewee 1)

On the other hand, Interviewee 3 mentioned "most of the population are aware of the value and need to make forest investments, but I am not saying all of them are, because that depends on the board of directors of the commission that changes from one locality to another. *"(...) In my case, people are aware that we need the forest, and local population is so sensitive about this issue, that a local association was founded. At first there wasn't any income, but now that we have it, we are going to make business with all forests by-products (biomass; tree resin; wood; mushrooms; honey). We are currently studying the*

possibility of exploring the potential of biomass, and analyzing proposals made to the local forest association. Consequently we are going to develop more, because the forest gives back in many ways and that is why I re-invest some of the money from wind farms in the forest.” (Interviewee 3)

Besides reflecting the obvious link between awareness and acceptance of proposals discussed and submitted to vote approval, these statements expressed within the same community, how demanding and conflicting management of benefits can be. Notwithstanding, it also showed, that it is possible to make long-lasting investments with significant profits for local community, contradicting the Aitken, (2010b) view on the subject. For instance, according to Interviewee 3 response there has been increasingly growing trend, to encourage the local use of different RES sources. Exploring diverse RES projects within the same area is ideal since according to Interviewee 1 the location area of wind farms is assigned to energy production and supply purposes for the next 25 years. Constituting another opportunity to expand RES project's influence and integration on local socio-economic scenario, increasing its future sustainability. Another advantage was detected by establishing a connection between interviewee's earlier opinions where concern with forest fires is patent and the possibility of developing other RES projects, namely usage of forest biomass as a supplementary source of energy generation. This future investment mentioned by Interviewee 3, would not only provide a clean and national energy source but also reduce the potential for fire deflagration. Examples of such coexistence between diverse RES have already been mentioned previously by other author's (see SEAI, 2011g) and were focused as being part of good practices when analyzing socio-economic impacts (see Section 2.4).

This has been accomplished because, even though Interviewees 1 and 3 testimonials were a reminder that even within community members there is a wide variety of perspectives, a common ground for a successful collaboration is always possible, when everybody is working to improve local community.

“This decision is consensual among people. Although initially there is always someone opposing, either because they disagree defending an opposite idea or

because they are misinformed or even because of political reasons; (there are people that do not miss that opportunity). For instance, despite this, I do not see in my village public opposition. At first it can be a bit difficult, but when people start seeing how benefited they are, they start transmitting that reality, and local acceptance has been really good.” (Interviewee 3)

“(…) Normally we almost never have conflicts within the board of directors, because we see this as an improvement to local community. Of course there is sometimes some resistance, but we manage to balance decisions. When we have an important decision to make that involves a large amount of money, like for instance, construction of a social equipment; reforestation; accessibilities improvement, we have a meeting assembly with all commission members, we vote and try to obtain the maximum number of votes possible, and only when we almost have unanimity we advance with a certain project. When we see a lot of resistance, we do not even try to follow through.” (Interviewee 5)

The way people access information concerning RES projects should also be taken into consideration in order to understand contradicting attitudes towards potential benefits, helping to comprehend and contextualize obtained responses. When questioned if initially during negotiation process people were well informed, obtained answers revealed ambiguity which lead to more resisting or accepting attitudes. In this case, reluctance has been associated to stigma towards the forest and misinformation rooted in increasingly declining rural activities that ultimately also influenced outcome of negotiation process. Interviewee 1 argued that *“initially there was a big competition for wind farm locations, with several promoters interested in negotiating with local populations, they did not explain what were the positive or negative aspects just referring the amount they would receive, if a contract was established. Let’s say potential impacts (positive or negative) were more known by the media and from one person to another, rather than through the projects promoter, from whom there was never great openness”*. These words reflect a bad practice situation that has already been experienced in previous case studies (see SEAI, 2011i) leading to incomplete and inadequate information, potentially lowering acceptance. Obtained statements from interviewees, contradict previous studies (see SEAI, 2011i) where it has been stated that promoters should take the first

step in order to fully engage local community, preferably establishing with them cooperative efforts based on transparency and accountability for all expected impacts (gains or losses), preventing them from being perceived later on as obstacles to RES deployment.

This liaison between local community and project developers can be performed by the land commission council reinforcing once again the crucial role this council has played in attending local stakeholders concerns throughout all phases of wind farm deployment. Meanwhile if situations like Interviewee 1 described are not dealt with, i.e. if public awareness is not restored, by establishing a bilateral information channel, this mistrust generated by misinformation and lack of discussion, might also have as will be further analyzed, effects on negotiation process and inevitably on the way community funds are perceived.

Otherwise, when promoters along with other stakeholders have that dialogue initiatives engaging local community, people become appropriately informed about project implications in anticipation to signing any contract, making an informed decision which might have a positive influence over community members increasing their acceptability to different forms of community funding. Aitken, (2010b) emphasized the likelihood of an early discussion and engagement by local community providing an increased acceptance.

“In my case people were informed before signing any agreement, to inform them I brought here engineers connect to RES projects, (...) and people were always informed about values, benefits (real ones or the ones we anticipated) and other advantages that we were not possibly expecting, people were always informed.” (Interviewee 3)

“We had inclusively several meetings, especially when we were about to reach an agreement. This was done in collaboration with local authorities, that also approved that sort of projects. There were many meetings as I said, and people were being informed about potential benefits. But this is a village, without many resources to invest locally. This also enticed people to allow wind farm construction; besides that, local community was aware of other projects in nearby villages and did not see any disadvantage.” (Interviewee 5)

As previously mentioned the timely access to information is likely to influence the outcome of contract negotiation, potentially contributing to beneficiate local communities. Here information plays a crucial role interfering with negotiation capacity; with the exception of one subject all interviewees ensured contract renegotiation. This result might possibly be related to the fact that initially, when the first wind farm was built in this region, circa 1994, the income was negotiated by number of turbines installed contrary to what is current practice (by installed power); and secondly not being entirely aware of the subject (advantages and disadvantages), lacking experience and negotiation skills might lead to a less successful negotiation process. As admitted by interviewee 7: *“(...) Our negotiation process was not very elaborate, we did not have negotiation skills for it. They arrived and offered a certain value per wind turbine, but we are not equipped to perceive if the amount is adequate or not (if it is very high or very low). (...) besides the promoters being very available during negotiation process, we did not have the knowledge to make that deal. At the time, that seemed obvious to me, so I tried different approach, trying to involve other local commissions in order to manage a broader negotiation. I still tried to look for professional help, but it was not possible.”* (Interviewee 7)

The quoted answer would be improved if Interviewee 1 suggestions were taken into consideration, since resorting to an independent institution throughout negotiation process would allow council representatives to negotiate at the same level of knowledge as other stakeholders, namely project developers. This view is consistent with Rogers et al., (2008):4225 findings, recommending community members to consult with experts in order to acquire “independent advice, support with technical issues and training” for local communities, guiding them in RES project initiatives.

This focused aspect of accessing accurate information allowed to establish here an interrelation between the concepts of justice and initial expectations over RES project implementation. For most research participants the type of community benefits schemes was within predictable, however what exceed their expectations was the amount of the income itself, since it is awarded for produced megawatt.

“I knew other wind parks so the sort of benefits was within what was expected, but for uninformed people I think benefits exceed their expectations. For me, what surpassed my expectation was the amount given, and I think the same thing happened to other people.” (Interviewee 3)

According to interviewees 2 and 5 the generated funds are managed by the commission reflecting a positive and fair outcome, favorable to all community members, because they developed an effort to within assembly meetings ensure that the income is used to benefit the entire community without damaging or benefiting others. For instance, Interviewee 2 stated that in order to avoid conflict within community members, all repairs concerning private accessibilities were textually excluded, making sure that no precedent is opened that favors some to the detriment of others.

“That issue of improving or developing accessibilities, is out of question because if you build a road to a certain place, you will never be able to control the assembly again, because then you have made for one and not for another. It will only benefit a few of the commission members, so we opted to exclude it textually. The only accessibilities we have approved were to the mountain, because till now we did not have accessibilities to fight wildfires, where the wind farms are installed, that was our most recent project.” (Interviewee 2)

Nonetheless, not all commissions managed to instate such clear rules in their activity plans regarding income distribution, but as Interviewee 1 demonstrated, the fact that some proposals benefit a group of individuals, for example local farmers, it is not synonym that the process was not perceived as fair, because all potential investments have been discussed and democratically voted during assembly meetings. This link between the will to embrace decisions that have not been unanimously considered beneficial to all the elements in local community and the “sense of fairness” of the “decision-making process” has been previously established by several authors (see Frey et al. and Gallagher et al., as cited in Aitken, 2010b:6067), being considered vital for public consent towards project implementation.

“The normal procedure is that the management of how the received income should be applied is defined during commission assembly meetings, and all the

members are convoked, normally proposals are made and an activity plan is established. Therefore it is natural that some proposals benefit more community as a whole, and others benefit more a certain group of individuals. For instance if we are talking about an improvement of a road that gives access to the village, everybody uses it benefiting the entire community. If, on the other hand we are talking about an improvement of a farming road or water line, we can say that it will benefit a group of farmers that uses those paths or water lines, but anyway both of those proposals were valid because they were proposed in front of the assembly, and were voted and approved with a majority of votes.”
(Interviewee 1)

As was patent from transcribed answers, most participants have declared that overall benefits far exceed disadvantages, contributing to respond to environmental and socio-economic requirements as far as energy sector is concerned, hence making a local contribution to sustainable development. Nonetheless, this global acceptance has found correspondence in previous literature (see Richards et al., 2012; and Rogers et al., 2008) does not mean that this theme is without controversy, as far as expectations are concerned. Being one of the downsides further explored moreover.

Future prospects and sustainability issues

Regarding future investments interviewees expressed their concern to re-invest the income in a way that has a long lasting effect, encompassing the most significant number of community members as possible. Answers also reflect that commission representatives are also taking their time, and exploring different options that entail diversification of investment as well as innovative approach to community benefit schemes, assumed two essential factors for a sustainable and successful approach to RES projects implementation. Clearly contradicting previous studies (see Del Rio and Burguillo, 2009b) as far as future prospects are concerned, being in this case considered far from modest.

“We have a former arboretum, that has been deactivated for more than 15 or 20 years and that is located near the wind park. We are currently studying the option of converting into a camping park. It is located in a beautiful area, and it already has houses that we are planning to restore and create a leisure area. It

is currently in a very bad shape, but as soon as the fund is available, we will invest in that future project, for sure.” (Interviewee 5)

Even though complementary investment was verified in both established groups, for the faction where people were more aware of forest's value and richness, a different approach can be perceived. In this case, commission representatives knowingly assumed investments in sectors that allied wind farm revenues with tourism and environmental interests, as well as projects considering other alternative sources of energy, such as biomass. Less informed communities of forest's potentialities and therefore more resistant to change have also seen very interesting projects approved that promote synergies with other local activities, but with less certainty about community's reaction and full support.

Such is the case of Interviewees 1 and 6 that despite admitting difficulties in achieving assembly member's approval towards diversified forest investment, have enrolled in projects to promote conservation of mountain habitats (HIGRO Project) or forest restoration while maintaining a more traditional yet regressing activity of cattle grazing. These examples are significant of the effort being developed by the local commissions in order to overcome the stigma and lack of information when reforestation is considered, trying to mitigate potentially restrictive effects on future activities that take advantage and explore the forests resources in a sustainable manner providing socio-economic advantages.

Whilst these constitute small steps in the right direction, helping to redirect investment in a traditional rural economic scenario with a valuable contribution to local welfare, divergent answers were still registered as to RES projects contribution to other sustainability related issues, like rural desertification.

According to a large majority of research participants, wind farms do not directly make a significant contribution to prevent this issue, mainly because local employment generation is viewed as the most important factor to maintain and attract younger population to the region. As Interviewees 2 and 6 mentioned, wind farms once implemented are known to directly employ a minimal amount

of workforce, not actively contributing to increase the local basis of the economy.

“No definitely not, especially because as we know the amount of work those wind parks can proportionate is very limited, we know after the construction, the workforce directly associated to these parks is very small. (...).” (Interviewee 6)

“These investments require temporary construction work, and then during operational phase they need maintenance. This maintenance will be made by a minimal number of qualified workers, therefore I think that this is not a relevant contribution to decrease desertification.” (Interviewee 2)

Despite this, other interviewees feel that RES projects can indirectly help to mitigate this problem, constituting an additional incentive to develop rural areas. Nevertheless the project contribution ultimately depends on the way community benefit schemes are effectively and strategically managed, considering both present and future needs.

According to Interviewee 1, there is an increase in income that is directly applied to answer local needs, empowering local community and indirectly enhancing local economy by maximizing opportunities that will contribute to settle population.

“It can help to reduce desertification because there is an increase in local income that will be directly invested. Managing entities have additional income available to invest in local community, increasing quality of life and contributing to increase the amount of outsiders. This consequently will stimulate local economy, boosting local commerce (housing; food chain services) creating job opportunities for young qualified people.” (Interviewee 1)

“Directly no; but indirectly there are investments being made; like for example the development of a leisure park, that creates jobs and attracts tourists that end up staying.” (Interviewee 3)

If this tendency is kept, a positive outcome could be perceived as far as wind farm potential contribution to mitigate desertification issues. Nonetheless other elements have been pointed out by several interviewees, that could potentially

negatively influence the capacity of permanently captivating people to local villages, by restricting the extent and future impact of socio-economic benefits inevitably influencing depopulation rate. For instance, Interviewees 3 and 6 illustrated opposing aspects of the link between revenues constituting community fund and approval of future investments that might have directly or indirectly some reflections on the abovementioned capacity. Interviewee 7, on the other hand, has attributed his negative perception to the nature of attributed community benefits.

“There are many houses being built. The decision either binding or not is very related to community benefits; I can speak for myself, as it was due to accessibilities improvement that I built my house. Being able to invest in local infrastructures, having good accessibilities, high quality facilities to care for our elderly and provide job security, people feel motivated because they like to stay here, and they will not need to leave. That is a way to secure and attract people.” (Interviewee 5)

“I know there are commission councils that have income that allows them to equate the possibility of developing not only productive infrastructure, but creating conditions for fixating people, and when I talk about this I mean creating local job opportunities, I do not doubt that. But in our case, we are only receiving a fraction of income provided by the wind park and as so - our projects are restricted by our budget.” (...) *For me besides that, there are other types of restrictions, it is not enough to create infrastructures, it is necessary to create favorable conditions for people to settle here (...) Right now it is not easy to find construction areas because we have several protected areas that act as barriers, and if we do not reach equilibrium between these two subjects, no matter how many more incentives we create we will not be able to attract them.”* (Interviewee 6)

“(...) For me, this sort of investment would have a real benefit for the region, if benefits were in terms of local energy supply. For instance, if the energy is produced locally, why do not we have free energy supply, or cheaper energy bills? It could make a big difference. (...) or if it brought jobs to local economy

(...) certainly even people that moved out to more urban areas, would come back to the village.” (Interviewee 7)

These statements inevitably reflect how legitimacy issues can potentially have an adverse influence on the outcome of RES projects for some villages, making it difficult to foresee investments that can captivate people to stay and live in the region. According to Interviewee 6 point of view, in order to promote local socio-economic potential, it is necessary to ensure that local authorities have appropriate developmental strategies and planning programmes. This registered perception has been also shared by Allen et al., (2012) since a good policy management has been designated as the first step in order to give impulse and coordinate community RES project at a local scale, allowing the promotion of conjoint actions with other stakeholders integrating social, economic and environmental goals to achieve a more sustainable outcome.

Due to the contrasting perspectives within the same community it is difficult to assess the future influence of RES projects on such a complex subject. However comparatively to former available literature (see Del Rio and Burguillo, 2009b), obtained results seem to indicate a more positive outcome in trying to prevent this tendency of depopulation of rural areas, based on wind farm deployment, especially given the significant effort from engaged community representatives in order to ensure a diversified range of opportunities, taking advantage of local available resources by studying more suitable alternatives. Such an attitude best expressed by Interviewee 3 when considering future biomass investments, has been reinforced by Allen et al., (2012) findings, evidencing the development of novel and suitable alternatives contributing to future local sustainability.

- **Concerns about potential negative impacts**

Overall answers coincided with initial expectations, with a predominance of benefits over negative impact perceptions, revealing a link between public acceptance and impact tolerance. According to interviews conducted, local community were willing to accept wind parks deployment by tolerating some environmental impacts provided these impacts were dealt with according to existing legal framework in order to monitor and mitigate them.

This behavior of recognition by some participants of the inevitability of some impacts and the will to reconsider and adapt, further supported evidence of attained revenues being perceived an effective persuasion to alter local community member's perceptions. For instance, when referring to potential visual impact Interviewee 3 stated that *"(...) people get easily used to visual impact, as long as there is interest and benefit involved. People recognize that benefits largely surpass disadvantages, at least that is what I've heard people say."* (Interviewee 3)

This attitude of forbearance towards environmental impacts considered less important, favoring a RES project could be corroborated by Katsaparakakis (2012) study, although the confirmation of such a strict link between this attitude and community benefits was only obtained by interviewees statements in the current case study. Despite this suspicion or prospect of community benefit schemes as a tangible persuasion factor being mentioned in previous studies (see Munday et al., 2011).

Potential visual impact perception

Visual impact has been theoretically considered a key issue in terms of wind farm deployment, as mentioned in previous Chapter 2.4. Nevertheless as mentioned by Interviewee 6, acceptance is dependent on community member's assessment, and as so considered inevitable but still accepted, not implying a negative perception.

"(...) As for visual impact resulting from wind energy deployment, we can't avoid it. Here we have no middle term, either you like it or not. Local population, mainly elderly people accepted it, I didn't see anyone criticizing. Above

everything else is what are we going to gain with that, I did not see a shocked attitude, not here. (...)." (Interviewee 6)

Interview results heightened an already established link between perception and acceptability of visual impact, with the extent and nature of visual impact being intrinsically related to location prospects (flat or mountainous morphology or distance from sensitive areas, for example). In general, research participants claimed a consensual acceptance of alterations made to natural landscape by introduction of wind turbines, implying that local communities were not significantly affected by it, since location wise, they were simultaneously installed on the top edges of mountains confining visual impact, and sufficiently distanced from residential areas avoiding visual disruption. According to Interviewee 1 *"in our case, I do not think we will have visual impact because wind parks are located very far away from the village (about 3km). From residential areas it will not be even possible to see it. We (village) are located in the lower part of the mountain, and the wind park at a very long distance on top, therefore it will not be visible.(...)"*. This result is in line with Aitken (2010b) and Katsaprakakis (2012) findings about determining who was the distressed community and the extent of that impact. It was established by these two authors, that the nearest communities to the wind farm were not necessarily the ones facing the greatest impact, because rocky areas tend to confine direct impact opposing flat areas tending to have more extensive impact areas, nearby residential areas.

The abovementioned interviewee statement also is indicative of a management process that successfully integrated the infrastructure with its surroundings, having a positive impact on local population, while taking full advantage of its location (described in Section 4.1). This good practice has also been featured by other authors (see SEAI, 2011b and Department of the Environment, heritage and Local Government, nod) that considered by taking advantage of the existing line in a mountainous topography, an optimum balance between site location and distance is reached, "maximizing exposure" to this resource while not being overbearingly close to local residential areas that could potentially cause visual disorder.

Comparatively to previously developed studies (see Saidur et al., 2008 and Katsaprakakis, 2012) cited in Section 2.4 for most commission council representatives the distance between a wind farm and the nearest village varies between a minimum of 3 km to a maximum of 6 km. These values coincide with estimations for minimal requirements to safeguard local settlements, since the distance of 3 km has been referenced by both cited authors, as the mark to avoid disturbances to local community (see Katsaprakakis, 2012), and the point from which there seems to be a neutral reaction to visual impact (Saidur et al., 2008).

Despite this fact, for the cases where interviewees declared wind farms being located below this minimum threshold, such as Interviewee 5, existence of visual impact was recognized but do not consider it of major importance, since the scenic characteristics of location site and surrounding areas, are not of cultural or touristic interest, therefore not alarming public opinion.

“It is obvious wind park creates a visual impact, but this area is not known for being a popular touristic destination. In my opinion there are other built infrastructures, like the local bridge, that have a bigger visual impact than wind turbines. Comparatively wind turbines are not perceived as such a negative impact on the landscape, of course you can see them and it is not the same as having a tree, but people adapt to it. The wind park is located about 2 km, in a straight line, from the local village.” (Interviewee 5)

Despite this observation, other interviewees noted that under the same circumstances, this could become an opportunity to further engage local community in RES projects, stimulating the relationship between local community and environment while contributing to increase the number of local visitors. Although at the moment this registered increase of visitors does not necessarily imply a positive impact on local tourism industry.

“Our wind park distances from the village about 4 km. In terms of visual impact, it was well accepted, and it has allured several visitors, mainly during weekends and summer time.”(Interviewee 4); *“(…) there is a good ground requalification of the site and it becomes appealing and people go up there and are awed.”* (Interviewee 3)

By accompanying and therefore instigating the application of certain measures assumed by the promoter (road maintenance for example), the interviewees are not only ensuring that they are being accomplished but also contributing to mitigate negative visual impacts, while promoting an adjustment and harmonization with surrounding areas. However according to Interviewee 5, local community is reliant on measures featured in national legislation to mitigate impacts associated to location site.

“We made a contract and we have rented a space, i.e. land to wind power producers. That space is used within the scope of environmental law, therefore the area can not be abandoned carelessly. They have to abide the law (...).”
(Interviewee 5)

Potential shadow flickering effect and electromagnetic interference impact perception

The same logic behind visual impact perception could be applied to explain absence of impact from shadow flicker effect and electromagnetic interference affecting local residential areas. This result is supported by previous statements regarding distances between wind farm location and residential areas. Once again, comparatively to previous studies approach in Section 2.4 referring shadow flicker effect's imperceptibility for distances over 1 km, not interfering with residential areas for the abovementioned reasons (see Katsaprakakis, 2012 and Minnesota Department of Health and Environmental Health Division, 2009). Electromagnetic interference impact is also highly dependent of distance, therefore, and similarly to what has been registered with visual and shadow flickering impact, it has been considered irrelevant.

Potential wildlife impact perception

Similarly to what was previously focused regarding promotion of wildlife preservation through community funds, research participants showed interest for mitigation of adverse impacts on local ecology but only limited to a certain extent. Similarly to visual impact relying on mitigation measures predicted by law, reinforcing once again the relevance attributed to legal framework, as well as EIA process.

Potential noise emission impact perception

Although noise emissions have been considered one of the most crucial impacts associated to wind power developments, with repercussions on public health and surrounding areas (see Section 2.4) initial suspicions that it would reflect on local communities were mostly unfounded.

For the most part of interviewees disturbances caused by noise emissions throughout construction and operational phases were not felt in neighboring residential areas. Posterior analysis of obtained results allowed to establish links between environmental noise and distance; wind direction as well as technology issues. Like visual impact, distance plays an important role in mitigating noise impact, decreasing it with increasing distance from the wind park infrastructure. For instance, as was previously mentioned, a large majority of villages distance themselves from wind parks an average range between 3 to 6 km, making them comparatively to other developed studies (see Leung and Yuan 2012) safe in terms of symptoms that might affect local community's welfare considering the minimum distance to avoid increasing stress levels has been considered at least 2 km.

“Probably in this case, we will not witness adverse effects of noise and air pollution from construction work, because our village is about 3 km in a straight line from the wind park.” (Interviewee 1)

“Our wind park is about 2 to 3 km from the village, and right now during construction phase, we haven't noticed any noise disturbances or dust.” (Interviewee 2)

Another relevant relationship between wind direction and noise was identified in Interviewee 3 statement. Although recognizing that sound emitted by wind turbines can be amplified by wind, his village has not been affected by generated sound. *“A slight noise can be heard if you are near the wind park, but other factors matter besides proximity, like the wind direction, which phase and work is being done, as well as location. My village is probably about 4 km from the wind park, and some wind turbines are already working, and we don't hear a thing.”* (Interviewee 3)

This answer is in agreement with findings Leung and Yuan (2011) has referred, that for distances above 300m noise emission from wind turbine is not influenced by wind direction. The same interviewee answer also reflected the importance of selecting the appropriate location for wind farm facilities, contributing to reduce impact in surrounding residential areas.

Several of the interviewed representatives have mentioned different stages of implementation of wind farms, possibly being subject to diverse types noise emissions, partly due to nature of sound (mechanical or aerodynamic source) or the period of time and phase of completion (temporary during construction work, or semi-permanent during operational phase). Regardless of that, mostly they claimed not having suffered of noise pollution, nonetheless measures were taken reduce its negative effects. For instance, Interviewee 3 claimed that special care has been taken to control noise emissions during certain periods of day, to avoid interference with highly ecologically sensitive areas; or Interviewee 5 also explained that although his village is still located at a considerable distance from the wind park, promoters have developed alternative accessibilities avoiding major noise disturbance to nearby settlements.

“During construction phase, the project’s promoters abide the rules already established by law, especially because we have there a special protection area for the Iberian wolf. Working during night time, is not allowed. As all construction work is carried out during day time and the generated noise is not as noticed as if it was during the night time. This is the sort of concerns they have during construction phase, and they are legally obliged to fulfill, so regarding this aspect I do not see it being troublesome. Concerning noise emissions in my village, and the area that I manage, we have not felt any negative impact, and we have never received any complaints either.” (Interviewee 3)

“(…) concerning noise emissions, in our village we have never had any disturbances, and we have also never seen anyone complaining about, because it is not bothering. Also our village is very far away from the wind park itself. The accessibilities to reach it do not pass through the village, alternative accesses to the wind park were created.” (Interviewee 5)

With a contrasting attitude to the rest of the interviewed group, Interviewee 7 stated that although no complaints by local community have ever been reported concerning this issue, he in particular considers his village is somewhat affected by noise emissions, being influenced by the prevalent wind direction. This “whooshing” sound effect potentiated by atmospheric instability, has been previously noted by other sources (see Saidur et al., 2011), and the annoyance caused can be minimized by resorting to a combination of improving the equipment design and location site (see SEAI, 2011c).

Potential interference with other economic activities impact perception

Potential property value impact perception

The abovementioned environmental impact has also been reported to have influenced other socio-economic aspects, besides the already analyzed link between environmental noise and public welfare. Most interviewees claimed that they saw no relationship between the two of them, with exception of Interviewee 5, that talked about the fact that although his village has seen a slight increase in house construction, although no causal relationship between this increase and the wind park could be proved.

“Specifically in our case, the wind farm has not been built yet, so that situation has not been verified. But everything makes me believe that is not going to happen, because our wind park is located very far away from our local village, from residential areas. Furthermore due to the steepness it won’t even be visible from our local community.” (Interviewee 1)

“The wind farms are so distanced from the village, that there is no influence whatsoever, especially regarding this issue.” (Interviewee 6)

Potential cattle grazing and farming impact perception

Despite some local community members having opposing views as to how wind farms affected traditional economic activities such as cattle grazing. A large majority of interviewed stakeholders believe that due to the location site of wind turbines, local productive system will not be negatively impacted.

“Regarding agricultural activities the question does not even apply, as for grazing activities because the wind turbine will occupy a very restricted area, it will not affect this activity and it will carry on. These wind parks are located on hilltops where previously to their implementation livestock grazing activities prevailed. These areas are very steep, therefore not appropriate for farming activities; they are mainly characterized by being stony and unfertile with typical altitude shrubs, which only profit is connected to grazing activities. This will only be unfeasible where the infrastructure is laid, and that is a very reduced area, maybe around 15 or 20 m per 15 or 20m.” (Interviewee 1)

Although Interviewees 3 and 6 share the opinion that construction of wind farms indirectly benefited local shepherds facilitating access to grazing pastures, meanwhile Interviewee 7 disagrees and views this new accessibility to pastures as quite shocking and as potentially compromising these habitat's management.

“In the same area that the wind farm is located we have a communal area for grazing, and the bigger the mountain is, in the middle of the forest, the harder it is to graze. We are traditionally a grazing area, and the requalification that wind parks entailed was good because animals themselves had more conditions to access and graze, cleaning that mountain which is beneficial for us. I do not see any negative impacts here. The park did not make any alterations that might damage local farming or pasture areas, we only benefited because we have asked and the company built accessibilities to certain grazing areas. If it was not for them, today these areas would have been inaccessible because of abandonment. If we talk and accompany, supervise, they do it, actually that is precisely what they are doing in our village. The loss of grazing areas in this case does not apply, and I am talking about the area I manage, my village.” (Interviewee 3)

“No, there is no interference with those activities, if anything wind parks only made them easier because I see shepherds riding mountain bikes everyday, something that would have never happened 50 years ago. Then the space a wind turbine occupies is practically insignificant, therefore not affecting grazing activities. Due to its location, impact in agricultural activities is out of question.” (Interviewee 6)

“I used to be a shepherd and I used to take my cattle grazing to the area where now the wind park is located, and initially it was a big shock to see all the people that now could access what used to be a difficult access area, and walking on grazing areas jeopardizing them.” (Interviewee 7)

Potential soil erosion and water resources impact perception

The investment in new accessibilities also accentuated other negative aspects that became evident throughout successive interviews, namely the concern with potential impacts on natural resources. For instance, Interviewee 1 highlighted that the development and maintenance of road accessibilities was a benefit that unveiled some disadvantages in terms of soil degradation and mobilization.

“Initial benefits such as development and maintenance of existing accessibilities were a positive addition, especially considering firefighting. But often these side roads end up having a negative effect on mobilization and soil degradation while having a positive effect as a barrier for fire propagation.” (Interviewee 1)

Aspects like land occupation and subsequent soil erosion were discussed previously to implementation of wind park's several infrastructures, taking into consideration the possibility of erosion triggering a more extensive effect interfering with both ecosystem's dynamic. According to Interviewees 3 and 5 potential adverse effects on existing water lines used for agriculture, was one of the main concerns of local population during negotiation process. This is a clear reflection of an essentially rural community, taking a pro-active attitude ensuring that promoters do not underestimate hydrological processes underlying the compound's location.

However, for Interviewee 1 most people regard land occupation as being confined to wind turbines space, when in fact this impact has a much more

widespread effect than initially supposed by public opinion. This attitude is a response to the underlying lack of information that gives them a partial perception of reality, and not enough sensibility and awareness to identify *“one of the negative impacts resulting from development of accessibilities.”* (Interviewee 1)

Despite this lack of notion of the extent of this specific impact, the importance attributed by local communities to the appliance of mitigation measures accounted for in current jurisdiction, have contributed to avoid amplification of potential impacts originated during construction work. This is quite relevant since soil erosion has been linked to loss and destruction of vegetation, and its severity proportional to the amount of flora removal. Nonetheless, this lack of knowledge has reflections in other aspects of wind farm deployment, as noted by Interviewee 1,

“If we measure the area of accesses destined to each wind turbine, we could be talking about acres per tower, and this is something that is not considered by people because when they think about land occupation, they are mainly considering the area occupied by the infrastructure, those 25 per 25 m. (...) if you ask most population about negative impacts, they will not be able to answer because they are not aware of this situation that was not explored by authorities, it was something they did not pursue. Usually they presented a certain amount of income per wind turbine, back then contract were still made by number of wind turbines, nowadays they have more capacity, more power and inevitably there is a loss.” (Interviewee 1)

This insightful account does not necessarily imply a failure in the implementation process of the project, but it might create a precedent where misinformation and miscommunication prevail. This situation has also been referenced in previous studies (see SEAI, 2011i), potentially leading to increasing anxiety and potentiate public objectors by “default position”, given that local community has trouble discerning what are the potential negative impacts and benefits that apply to their specific case and locality due to incomplete knowledge.

Prevalence of lack of information might lead to registered accounts of opposition, mainly established by lack of opportunities to become actively involved in the project motivating resistance to accept and understand the variety of community benefitschemes; that could be applied, restricting their negotiation with promoters and also the approval of proposals in assembly contributing to frustrate initial expectations. This might be a partial explanation for the reaction obtained from Interviewee 7 who considered that overall this was not such a positive investment for the region after all, even taking into consideration the financial component. The other part might be connected to previously analyzed answers, namely the (in) capability of negotiating and managing the attributed sum.

“In my opinion the income is not significant. For me, this sort of investment would have a real benefit for the region, if benefits were in terms of local energy supply. For instance, if the energy is produced locally, why don’t we have free energy supply, or cheaper energy bills. It could make a big difference. (...) or if it brought jobs to local economy, just the income itself is not rewarding (...) because to what extent are authorities and people effectively managing the attributed amount to obtain the best outcome? Honestly from my experience, I would prefer either not to have them, or to have negotiated them differently, for instance so that the benefit reverts into services, because that way the benefit would be direct.” (Interviewee 7)

These statements illustrate the fundamental need to incorporate local community members in all aspects of wind energy projects, in order to obtain public consent constituting an opportunity to incorporate suggestions made by them, further adjusting benefits to local needs, since proposed suggestions come from people with local knowledge. For instance, interviewee 7 suggested some alternatives in terms of types of community benefits that have been cited in other cases (see Munday et al., 2011 and SEAI, 2011h), but due to current national legislation, benefits concerning local energy supply are not applicable. Although this opportunity to adapt “community benefit schemes” to local needs, has already been established (see Aitken, 2010a), once again, and taking into consideration interviewees previous answers, for this cooperation to prove effective it might be necessary to provide community members with assistance,

as suggested by Interviewee 1. This suggestion would allow to further involve focal stakeholders, helping to increase awareness avoiding proposals that are not applicable, while developing other options more appropriate for this specific location.

Potential vested interests impact perception

According to Interviewee 6 the main negative impact associated to these RES projects is verified when there are vested interests within local community, degenerating in trust issues. In this case study mistrust within stakeholders is promoted by economic interests associated to community benefit schemes attribution and the way they are being managed and re-invested. This conflicting behavior often leads to legal battles over who is entitled to manage and usufruct of the advantages of RES projects, defrauding a broader sense of community that has been patent in various interviewees answers, constantly focusing on community as a hole unit, and trying to suppress their needs instead of favoring individual parties.

“(...) It is one of the disadvantages, if not the biggest disadvantage from wind farms, it generates conflicts within local community, when ulterior economic interests are identified. (...) In our case, the old manuscripts describe this area as a common area destined to animal pasture, which was back then the main source of income connected to these mountain areas. One of the stakeholders (another village) did not see it that way, and went into negotiation process without consulting any of the other parts, which lead to the existing conflict.(...)”
(Interviewee 6)

The exemplified situation illustrated that relationships amongst community members are precisely at the core of this issue, and in order to fully understand and address it, it is necessary to be aware of social context and connections between community members, in order to avoid intensification of conflicts. Interviewee 1 suggestion of external counseling might also help to mediate Interviewee 6 situation, generating an environment adequate for negotiation purposes, improving the odds of reaching a positive outcome for both parties. Support and encouragement from external institutions has also been reported

(see Rogers et al., 2008) further promoting trust and motivation to cooperate in local community, supporting Interviewee 1 point of view.

Chapter 5

Conclusions and Future Research

5. Conclusions and Future Research

Although the relevance of wind energy's role towards a more sustainable energy system has been thoroughly recognized, with several case studies displaying impacts from its deployment, very few case studies have focused social dimension at a local scale, resorting to an exclusively qualitative methodology. This work aimed to develop such an approach and contributing to determine what were the main social impacts at local level from stakeholder's perspective.

To achieve the proposed research objectives a participative methodology supported on a case study selection and stakeholders interviews was designed and implemented. The intricate established research design allowed to, throughout its different phases refine and refocus the interviews towards crucial subjects, essentially based on focal stakeholder's perceptions. This aspect was extremely important, allowing to further establishing how those impacts were being perceived, ultimately leading to a logical understanding of obtained data.

The results heightened the relevance of local social and cultural aspects when addressing benefits or social costs ascribed to RES projects. The main social aspects of RES research were identified, as well as the nature of the issues that led to the obtained answers, while simultaneously establishing a comparison with other previous studies.

The results of the research put in evidence that, as initially expected, a large majority of interviewees did not point out disadvantages that significantly altered their quality of life, and most of the research participants declared themselves in favor of this type of investment.

These opinions seem to be mainly driven by the perceived benefits resulting from wind farm deployment. The interviews outcomes denote a similarity between the main types of social benefits identified in literature review, yet with significant differences as for distribution within each type, emphasizing indirect employment, the use of benefits in kind; reinvestment of obtained revenues and non-applicability of project ownership. These discrepancies have illustrated how challenging can management of community benefit schemes be, being in this case mainly connected to an identified mix of cultural background, misconception and misinformation issues deeply rooted on local traditions.

These issues should be tackled with a widespread integrative solution involving various stakeholders within negotiation process, in order to achieve a more consensual, future length appropriate outcome. Reinforcing the importance of local community perception's to achieve local sustainability.

In view of abovementioned considerations, as a future prospect a cause –effect diagram, in this case, seems to be the most appropriate tool to expose and identify several causes of interference in wind farm implementation, allowing an integrated approach, featuring all dimensions of sustainable development. Adoption of such a management instrument would help focal stakeholders not only to showcase the multiple dimension of these projects, but also along side with different peers develop a strategic approach encompassing social, economic and environmental issues. This would allow to, heightening participatory approach in order to identify the source of the problem, and develop with local community's input appropriate solutions that value local resources in a sustainable manner.

Introducing this supplementary item in the current planning process, allied with an independent entity that provides expertise for consultation purposes, as envisaged by some interviewees, would provide future meetings with local authorities and project developers, as well as assembly meetings with accurate information promoting an opportunity for all interposers to express their opinions, and discuss potential opportunities of investment through a different light, equating all available scenarios.

Furthermore given previous interviewees statements this constitutes a means to contribute to solve information; knowledge; communication and trust issues that seem to be at the core of some participants statements; for other commission councils where steps in this direction are already being taken, this approach would provide a more holistic vision of what investments in RES projects entail, and the possibility of equating all factors in future decision making process.

The results of this research demonstrate the importance of local and regional social impact assessment on RES projects. The presented case study revealed a consensual acceptance of the benefits of these projects but the validation of these results and their representativeness on National scale can only be achieved if the work proceeds with the analysis of other regions and even of

other less consensual technologies. The implementation of the proposed participative methodology to other case studies would be a particular benefit providing new insights to both the scientific field of social impact assessment and to the sustainable energy decision making. The proposed future work should further help determining if local characteristics (considering both existing natural and social resources) bear some influence over the way community benefits are spent, implying a pattern in terms of its future investment; or if a different dynamic between focal stakeholder's interaction would result in more innovative and diversified projects entailing a much more significant contribution towards sustainability of isolated rural communities.

References

- Aguiar, R.; Santos, F.D. (2007). Prospective Model for Greenhouse Gas Emissions in Portugal. Version 2.2. Final Report, Volume I: Reference Scenarios (in Portuguese). Project MISP – Climate Change: Mitigation Strategies In Portugal. Calouste Gulbenkian Foundation and Instituto D.Luiz, Lisbon. 1-184.
- Aitken, M. (2010a). Why we still don't understand the social aspects of wind power: A critique of key assumptions within the literature. *Energy policy*.38 (4).1834-1841.
- Aitken, M. (2010b). Wind Power and Community Benefits: Challenges and Opportunities. *Energy policy*.38(10). 6066-6075.
- Allan G.; Mcgregor, P.; Swales, K. (2011). The importance of revenue sharing for the local economic impacts of a renewable energy project: A social accounting matrix approach. *Regional Studies*.45(9).1171-1186.
- Allen, J.; Sheat, R.W.; Chavez-Diaz, R. (2012). Community – based Renewable Energy in the Lake District National Park – local drivers, enablers, barriers and solutions. *Local Environment: The International Journal of Justice and Sustainability*. 17 (3). 261-280.
- APREN - Portuguese Renewable Energy Association.(2012). Linhas Estratégicas para a Revisão dos Planos Nacionais de Ação para as Energias Renováveis e Eficiência Energética (in Portuguese). APREN. Retrieved from:http://www.apren.pt/fotos/editor2/linhas_estrategicas_pnaer_resposta_apren_29junh_o2012.pdf
- Blanco, I.M.; Rodrigues, G. (2009). Direct employment in the wind energy sector: Na EU study. *Energy Policy*. 37 (8). 2847-2857.
- Comissão para as Alterações Climáticas. (2002). Programa Nacional para as Alterações Climáticas (PNAC 2001). Comissão para as Alterações Climáticas. 1-79. Retrieved from: <http://www.energiasrenovaveis.com/images/upload/PNAC.pdf>
- Cuartas, M. B.; Menendez, J. A. (2008). The effect of renewable energy on employment. The case of Asturias. *Renewable & Sustainable Energy Reviews*.12 (3).732-751.
- Del Río, P.; Burguillo M. (2008a). Assessing the impact of Renewable energy deployment on local sustainability: Towards a theoretical framework. *Renewable & Sustainable Energy Reviews*.12(5).1325-1344.

Del Rio, P.; Burguillo, M. (2009b). An empirical analysis of the impact of renewable energy deployment on local sustainability. *Renewable and Sustainable Energy Reviews*. 13(6-7). 1314-1325.

DGEG- Portuguese Directorate for Energy and Geology. (2012a). National Energy Strategy- National Strategy for Energy- ENE 2020. Retrieved from: <http://www.dgeg.pt/>

DGEG. (2012b). Energy Policy- Caracterização Energética Nacional 2010 (in Portuguese). Retrieved from: <http://www.dgeg.pt/>

DGEG. (2012c). Energy/Environment/Sustainable Development–Energy assumes a vital importance on nowadays economy. Retrieved from: <http://www.dgeg.pt/>

Denzin, K.N.; Lincoln, S.Y. (2000). Introduction –The discipline and Practice of Qualitative Research. In N.K. Denzin & Y.S. Lincoln (Eds.). *Handbook of Qualitative Research*. 2nd Edition. Thousand Oaks, California: Sage Publications.

Department of the Environment, Heritage and Local Government. (nod). Planning Guidelines. Department of the Environment, Community and Local Government. (pp. 15-33). Retrieved

from: <http://www.environ.ie/en/Publications/DevelopmentandHousing/Planning/FileDownload,1633,en.pdf>

Endl, A.; Sedlacko, M. (2012). National Sustainable Development Strategies – What Future Role with Respect to Green Economy? *European Sustainable Development Network (E:SD:N)*. 1-29. Retrieved from: http://www.sd-network.eu/pdf/policy_briefs/ESDN_UNCSD_Policy_Brief.pdf

Elsayed, Y.; Jones, E. (2008). Developing an EDC performance evaluation toolkit for affiliated and non-affiliated hoteliers. (Doctoral Dissertation). Retrieved from: <http://repository.uwic.ac.uk/dspace/bitstream/10369/843/12/11Chapter%20two.pdf>

European Union (2011a). Energy 2020. A strategy for competitive, sustainable and secure energy. Directorate General for Energy. (p.23). European Commission. Luxembourg: Publications Office of the European Union. Retrieved from: http://ec.europa.eu/energy/publications/doc/2011_energy2020_en.pdf

European Union. (2011b). Renewables make difference. (p.5). Directorate General for Energy. European Commission. Luxembourg: Publications Office of the European Union. Retrieved from: http://ec.europa.eu/energy/publications/doc/2011_renewable_difference_en.pdf

Ferreira, P. (2007). Electricity Power Planning in Portugal: The Role of Wind Energy. (Doctoral Dissertation). Retrieved

from:http://repositorium.sdum.uminho.pt/bitstream/1822/7816/1/Tese%20Doutoramento_P_aula_Varandas_Final.pdf

Given, M.L. (2008).The SAGE Encyclopedia of Qualitative Research Methods. (2). Retrieved from: <http://www.mendeley.com/research/qualitative-research-interviewing/#page-1>

Hale, D.C.; Astolfi, D. (2007). Evaluating Education and Training Services: A Primer. (9). Florida. Retrieved from:http://www.charlesdennishale.com/books/eets_ap/9_Qualitative_Research_Designs.pdf

INE- National Statistics Institute. (2012). Censos 2011 – Resultados Pré-definitivos: Mais de um milhão e duzentos mil idosos vivem sós ou em companhia de outros idosos. INE. Retrieved from:http://www.ine.pt/xportal/xmain?xpid=INE&xpgid=ine_destaques&DESTAQUESdest_bou_i=134582847&DESTAQUEStema=55466&DESTAQUESmodo=2

INEGI and APREN - Institute of Mechanical Engineering and Industrial Management and Portuguese Renewable Energy Association Wind Farms in Portugal. (2011). Retrieved from:http://www.apren.pt/fotos/gca/portugal_parques_eolicos_201112_1332348050.pdf

INESC Porto and AT Kearny - Institute of Systems and Computer Engineering of Oporto and AT Kearny. (2012). Recomendações para uma Estratégia Sustentável de Eficiência Energética e Exploração de Energias Renováveis em Portugal (in Portuguese). INESC Porto and AT Kearny. Retrieved from:http://www2.inescporto.pt/SEE_JAN2012.pdf/

Izutsu, k.;Takano, M.; Furuya, F; Iida, T. (2012). Driving actors to promote sustainable energy policies and businesses in local communities: A case study in Bizen city, Japan. Renewable Energy.39 (1).107-113.

Katsaprakakis, Al.D. (2012). A review of the environmental and human impacts from wind parks.A case study for the Prefecture of Lasithi. Renewable and Sustainable Energy Reviews.16(5). 2850-2863.

King, N. (2004). Using Interviews in Qualitative Research.In C. Cassel & G. Symon, (Eds.).Essential Guide to Qualitative Methods in Operational Research. (pp. 10-22). London: SAGE Publications.

Leung, D.Y.C.; Yuan, Y. (2012). Wind energy development and its environmental impact: A review. Renewable and Sustainable Energy Reviews.16(1).1031-1039.

Lincoln, S. Y.; Guba, G. E. (2000) Paradigmatic Controversies, contradictions and Emerging Confluences.In N.K. Denzin& Y.S. Lincoln (Eds.).Handbook of Qualitative Research.2nd Edition. (pp.1-70). Thousand Oaks, California: Sage Publications.

Mack, N.; Woodsong, C.; Macqueen, K.; Guest, G.; Namey, E. (2005). Qualitative Research Methods: A Data Collector's Field Guide. (Module 1- Qualitative Research Methods Overview). Family Health International. U.S. Agency for International Development (USAID). Retrieved

from: <http://www.fhi360.org/nr/rdonlyres/emgox4xpcoyrysqspsgy5ww6mq7v4e44etd6toiejyxa/lhbmK5sdnef7fqlr3q6hlwa2ttj5524xbn/datacollectorguideenrh.pdf>

Mendes, L.; Costa, M.; Pedreira, J.M. (2002). A Energia Eólica e o Ambiente- Guia de Orientação para a Avaliação Ambiental (in Portuguese). Alfragide. Instituto do Ambiente Editions.

Retrieved from: http://www.apambiente.pt/_zdata/Instrumentos/AIA/Guia_de_Orientacao_para_a_Avaliacao_Ambiental_PE.pdf

Ministério da Economia Inovação e Desenvolvimento. (2010). RE.NEW.ABLE. A Inspirar Portugal – Plano Novas Energias ENE 2020. MEID. Retrieved from:

http://www.google.pt/url?sa=t&rct=j&q=renewable%20-%20inspirar%20portugal%2Bplano&source=web&cd=1&sqi=2&ved=0CCIQFjAA&url=http%3A%2F%2Fwww.renewable.pt%2Fpt%2FPortugal%2520e%2520a%2520Energia%2FPaginas%2FENE2020.aspx&ei=I9kdT_CBFo26hAfP9sXRDA&usg=AFQjCNGWtytiaAGHvxBUtuAbWv7DowOSxQ

Minnesota Department of Health and Environmental Health Division. (2009). Public Health Impacts of Wind Turbines. Retrieved from: <http://www.health.state.mn.us/divs/eh/hazardous/topics/windturbines.pdf>

Miles, M.B.; Huberman, M.A. (1994). : Qualitative Data Analysis: An Expanded Sourcebook. 2nd Edition. Thousand Oaks: SAGE Publications.

Miranda, R.C.S.A. (2007). O Papel da AIA na Melhoria da Qualidade dos Projectos no Caso dos Parques Eólicos (in Portuguese). (Masters Dissertation). Retrieved from: http://repositorio.ul.pt/bitstream/10451/1447/1/20901_ulfc080580_tm.pdf

Munday, M., Bristow, G.; Cowell, R. (2011). Wind farms in rural areas: How far do community benefits from wind farms represent a local economic development opportunity?. Journal of Rural Studies. 27 (1). 1-12.

Neuman, W. L. (2003). Social Research Methods: Qualitative & Quantitative Approaches. 5th Edition. (pp. 20-90). Boston: Allyn & Bacon.

Oliveira, V.J. (2000). Entrevistas (in Portuguese). Retrieved from lecture notes online web site: <http://w3.ualg.pt/~jvo/ep/entre.pdf>

Pedersen, E.; Berg, F.; Bakker, R.; Bouma, J. (2009). Response to noise from modern wind farms in The Netherlands. *Acoustical Society of America*. 126 (2). 634-643.

Partidário, M.; JESUS, J. (2003). *Fundamentos de Avaliação de Impacte Ambiental*. Manual da Universidade Aberta (in Portuguese). Lisboa: Universidade Aberta.

Quercus (2012). Summary Description of the Project- HIGRO: Demonstrative Actions for the Conservation of Priority Habitats in Northern Mountain Areas in Portugal. Retrieved from: <http://higro.org/english/>

Raupp, M.F.; Beuren, M.I. (nod). *Metodologia da Pesquisa Aplicável às Ciências Sociais*. (in Portuguese). (3). Retrieved from: http://www.geocities.ws/cienciascontabeisfecea/estagio/Cap_3_Como_Elaborar.pdf

REN- National Energy Network. (2011). *A Energia Eólica em Portugal 2011* (in Portuguese). REN. Retrieved from: <http://www.centrodeinformacao.ren.pt/PT/publicacoes/EnergiaEolica/A%20Energia%20E%C3%B3lica%20em%20Portugal%20-%202011.pdf>

RenewableUK. (2011). *A Community Commitment- The benefits of onshore wind*. (pp. 1-28). RenewableUK. Retrieved from: <http://www.bwea.com/pdf/publications/CommunityBenefits.pdf>

Ribeiro, F.; Ferreira, P.; Araújo, M. (2011). The inclusion of social aspects in power planning. *Renewable and Sustainable Energy Reviews*. 15(9). 4361-4369.

Richards, G.; Noble, B.; Belcher, K. (2012). Barriers to renewable energy development: A case study of large-scale wind energy in Saskatchewan, Canada. *Energy Policy*. 42. 691-698.

Rogers, J.C.; Simmons, E.A.; Convery, I.; Weatherall, A. (2008). Public perceptions of opportunities for community –based renewable energy projects. *Energy Policy*. 36 (11). 4217-4226.

Rubin, A. and Babbie, E. (1997). *Research Methods for Social Work*. 3rd Edition. (pp. 1-405) Pacific Grove, California: Brooks/Cole Publishing Company.

Saidur, R.; Rahim, N.A.; Islam, M.R.; Solangi, K.H. (2011). Environmental impact of wind energy. *Renewable and Sustainable Energy Reviews*. 15 (5). 2423-2430.

Sastresa, Llera E.; Úson, Aranda A.; Bribián, Zalbaza I.; Scarpanelli, S. (2010). Local impact of renewables on employment: Assessment methodology and case study. *Renewable and Sustainable Energy Reviews*. 14(2). 679-690.

Santos, M. (2008, April 23). Qualitative and Quantitative Measurement Process.[Web log comment]. Retrieved from:<http://mariosantos700904.blogspot.pt/2008/04/sobre-existncia-de-hipteses-no-processo.html>

Saunders, M., Lewis, P., & Thornhill, A. (2007). Research methods for business students (in Portuguese). 4th Edition. London: Prentice Hall.

Schwant, T.A. (2000). Three Epistemological Stances for Qualitative Inquiry. In N.K. Denzin & Y.S. Lincoln (Eds.). Handbook of Qualitative Research. (p. 192). 2nd Edition. Thousand Oaks, California: Sage Publications.

SEAI- Sustainable Energy Authority of Ireland.(2011a). Thematic Case Study Drafts.Undertaking Socio-Economic Impact Assessment.(Case Study Theme 16). Sustainable Energy Authority of Ireland. Retrieved from:http://www.seai.ie/Renewables/Wind_Energy/Good_Practice_Wind/Good_Practice_Wind_Thematic_Case_Studies_Drafts_-_Themes_9-16.pdf

SEAI.(2011b). Thematic Case Study Drafts.Landscape & managing Visual Impact.(Case Study 10). Sustainable Energy Authority of Ireland. Retrieved from:http://www.seai.ie/Renewables/Wind_Energy/Good_Practice_Wind/TCS_10_Landscape_and_Managing_Visual_Impact.pdf

SEAI.(2011c). Thematic Case Study Drafts.Dealing with Noise Issues.(Case Study 11). Sustainable Energy Authority of Ireland. Retrieved from:http://www.seai.ie/Renewables/Wind_Energy/Good_Practice_Wind/TCS_11_Dealing_with_Noise.pdf

SEAI.(2011d). Thematic Case Study Drafts.Impacts on Habitats.(Case Study 11). Sustainable Energy Authority of Ireland. Retrieved from:http://www.seai.ie/Renewables/Wind_Energy/Good_Practice_Wind/TCS_2_Habitats.pdf

SEAI.(2011e). Thematic Case Study Drafts.Species Impact Offshore and Onshore.(Case Study 1). Sustainable Energy Authority of Ireland. Retrieved from:http://www.seai.ie/Renewables/Wind_Energy/Good_Practice_Wind/TCS_1_Species.pdf

SEAI.(2011f). Thematic Case Study Drafts.Biodiversity.(Case Study 3). Sustainable Energy Authority of Ireland. Retrieved from:http://www.seai.ie/Renewables/Wind_Energy/Good_Practice_Wind/TCS_2_Habitats.pdf

SEAI.(2011g). Thematic Case Study Drafts.Conflicts with other Economic Interests including Tourism.(Case Study 12). Sustainable Energy Authority of Ireland. Retrieved

from:http://www.seai.ie/Renewables/Wind_Energy/Good_Practice_Wind/TCS_12_Conflicts_with_other_Economic_Interests.pdf

SEAI.(2011h). Thematic Case Study Drafts.Community Benefit Schemes.(Case Study 14).Sustainable Energy Authority of Ireland. Retrieved from:http://www.seai.ie/Renewables/Wind_Energy/Good_Practice_Wind/TCS_14_Community_Benefit_Schemes.pdf

SEAI.(2011i). Thematic Case Study Drafts.Communications; Awareness; Information Cascades.(Case Study 9).Sustainable Energy Authority of Ireland. Retrieved from:http://www.seai.ie/Renewables/Wind_Energy/Good_Practice_Wind/TCS_9_Communications_Awareness_and_Information_Cascades.pdf

SEAI.(2011j). Thematic Case Study Drafts.Carbon Accounting for Wind Farms.(Case Study 6).Sustainable Energy Authority of Ireland. Retrieved from:http://www.seai.ie/Renewables/Wind_Energy/Good_Practice_Wind/TCS_6_Carbon_Accounting.pdf

SEAI.(2011k). Thematic Case Study Drafts.Tackling cumulative Impacts.(Case Study 4).Sustainable Energy Authority of Ireland. Retrieved from:http://www.seai.ie/Renewables/Wind_Energy/Good_Practice_Wind/TCS_4_Tackling_Cumulative_Impact.pdf

SEAI.(2011l). Thematic Case Study Drafts.Systems and Process for Monitoring Impacts; Examples of Environmental Mitigation Techniques.(Case Study 4).Sustainable Energy Authority of Ireland. Retrieved from:http://www.seai.ie/Renewables/Wind_Energy/Good_Practice_Wind/TCS_5_Monitoring_and_Mitigation_Techniques.pdf

SEAI.(2011m). Thematic Case Study Drafts.Dealing with Complex or Entrenched Public Perception Issues.(Case Study 15).Sustainable Energy Authority of Ireland. Retrieved from:http://www.seai.ie/Renewables/Wind_Energy/Good_Practice_Wind/TCS_15_Complex_or_Entrenched_Public_Perception_Issues.pdf

Silva, C.J. (nod).Manual de Investigação em Ciências Sociais (in Portuguese). Retrieved from lecture notes online web site:<http://www.fep.up.pt/docentes/joao/material/manualinvestig.pdf>

Silverman, D. (2004). Qualitative Research: Theory, method and practice. 2nd Edition.(pp.125-177). London: SAGE Publications.

Vieira, D.F. (2007). Distritos Industriais e Inovação: O Sector dos Moldes em Portugal (in Portuguese). (Doctoral Dissertation). Retrieved from: <http://repositorium.sdum.uminho.pt/handle/1822/7315>

WBCSD – World Business Council for Sustainable Development.(2012). Executive Brief Energy & Climate.WBCSD. Retrieved from:<http://www.google.com/url?sa=t&rct=j&q=&esrc=s&source=web&cd=2&ved=0CCgQFjAB&url=http%3A%2F%2Fwww.wbcsd.org%2FPages%2FAdm%2FDownload.aspx%3FID%3D6954%26ObjectTypeId%3D7&ei=C0SAUI3MHIzhAeG44H4BA&usg=AFQjCNHYjlcqk18wbzy9sLkUwcNlLjLc9Q&sig2=s92BH-qPkZnR3FF0pM53kg>

Yin, Robert K. (2009).Case study research: design and methods. Applied social Research Methods Series.4th Edition. Volume 5.(pp. 3-25). SAGE Publications.

Annex I

Interview Guide

Scope

Good Morning! My name is Maria de Fátima Lima and I am developing a study in collaboration with Minho University, aiming to determine what are main impacts (positive or negative) associated to wind farm deployment, from local stakeholder's perspective. Data gathered has a confidential nature and will only serve this study's purpose. As so, am I granted authorization to record the following interview?

Questions

1. What are the main advantages, for your village, resulting from RES project deployment?

Benefits mentioned by interviewees:

Direct Benefits:

Indirect Benefits:

Main benefits mentioned in literature review:

- Attribution of community funds in form of revenues for rental of communal land;
 - Project ownership;
 - Cheaper energy bill;
 - Job generation (temporary- resulting from construction and operational phases);
 - Resource to local workforce and products (temporary- resulting from construction and operational phases);
 - Investment in technical education programmes;
 - Increase of local commercial activities;
 - Revitalization of local tourism;
 - Donations and support of local institutions and events;
 - Development or improvement of local infrastructures (accessibilities; social equipment);
 - Investment in environmental awareness initiatives (educational centers);
 - Promotion of environmental preservation projects;
 - Development of energy efficiency initiatives.
-

2. Are mentioned benefits are only verified during initial phases of wind farm deployment?

2.1 Yes

2.2 No. Please exemplify.

3. Wind parks are usually associated to less adverse impacts, for instance noise emissions or visual impact, has Commission Council been aware of local communities complaints regarding this issue?

3.1 If yes, please exemplify.

Main adverse impacts mentioned by interviewees:

Main adverse impacts mentioned in literature review:

- Adverse effect on public health (stress; sleep disturbances; irritability, among others);

- Temporary nature of Job opportunities;

- Resource to workforce external to local community;

- Decreasing value of land and housing;

- Loss of benefits associated to traditional activities (agriculture, live stock grazing, etc);

- Loss of biodiversity and habitat destruction;

- Emission of noise and air pollutants (especially during construction phase, as well as operational phase).

4. In a previous phase to project implementation, has Commission Council registered cases of resistance to wind farm deployment? As the one verified towards other environmental projects/equipments.

4.1 In case of a positive answer have community funds contributed to alter community's perception towards RES projects?

5. Considering either initial positive or negative impacts, have initial expectations been surpassed or not?

5.1 If yes. How? (please elaborate)

5.2 If not why? (please justify)

6. From local community's perception, have benefits been reflected throughout entire community or have some segments of population been favored?
7. During negotiation process have other measures been taken into consideration, in order to create added value for local community?
8. What would be, according to local community members the main reasons to approve wind farm deployment in interviewee's village? (local benefit vs global benefit).
9. During negotiation process, has local community been accurately informed and aware of advantages and disadvantages associated to wind farm deployment?
10. Have other aspects such as renegotiation possibility been considered by Commission Council?
11. Does the interviewee consider that attributed revenues have been appropriately managed by local Commission Council, effectively answering local communities needs?
12. If not why? (please justify) And in that case what could be further done?
13. Did investments from community fund actively contribute attract population to reside permanently in these villages, mitigating rural desertification?

Thank you for the availability to answer proposed questions.