The multi-faceted nature of preferences for offshore wind farm sitting

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The multi-faceted nature of preferences for offshore wind farm siting.

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Highlights

We explain tourist preferences for offshore wind farms in the Mediterranean Sea.

We develop a method using PCA that quantifies the heterogeneous effects of tourists' beliefs

NIMBYism is a poor foundation for explaining opposition to wind farm siting.

Visual nuisances may be explained as the joint outcome of a vector of aesthetic and non-aesthetic concerns.

We provide keys to effectively address public acceptance of offshore wind farms.

Abstract[1]

There is increasing consensus that NIMBYism is a deficient explanation for widespread resistance to the installation of wind power facilities. This paper addresses this deficiency by examining the determinants of tourist preferences over the position of offshore wind farms at different distances from the shore in the Mediterranean Sea. A principal component analysis is used to retrieve general attitudinal themes, which act as covariates in a choice model. We demonstrate the role of respondents' opinions on energy policy, perceived urgency of tackling climate change, NIMBY objections, nationality and education in explaining preferences for the siting of offshore wind farms.

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1. Introduction

Energy planners are often said to be faced with the trilemma of sustainability, security of supply and competitiveness, but a fourth problem is being increasingly recognised; that of public acceptance (Renssen 2011). The proposal to install offshore wind farms in the French region of Languedoc Rousillon, to help that nation meet its commitment to increase the share of renewable energy[2], has met significant local resistance (BRL 2003; Guipponi 2011). Opponents argue that offshore wind farms would disrupt a unique seascape, to the detriment of the tourist industry (Conseil Municipal Portiragnes 2010). As nations strive towards transitioning to a low carbon economy, and increase the share of renewables in their energy mix, tackling obstacles at the local level is becoming increasingly urgent. Ellis et al. (2007) suggest that local resistance is related to value clashes over governance, technology, landscape aesthetics, issues of participation and power inequalities. In this light, research that can unpick the dynamic subjectivities framing wind farm disputes may offer insights that point towards how to overcome the current policy impasse (Ellis et al. 2007).

In this paper, we examine the determinants of tourist preferences for the siting of offshore wind farms in the Mediterranean Sea. A principal component analysis is employed to retrieve general attitudinal themes (components), which are used as covariates in a choice model designed to help us understand the various sources of preference heterogeneity regarding the installation of offshore wind farms at different distances from the coast. Previous studies have approached an explanation of preferences through considering the role of socio-demographic factors (Krueger et al 2011; Bishop & Miller, 2007; Frantal & Kunc, 2011; Lilley, Firestone, & Kempton, 2010; Ladenburg, 2010), prior experience with wind farms (Krueger et al 2011), and the respondents' use of the coastal zone (Ladenburg & Dubgaard, 2009; Ladenburg, 2010). To the authors' awareness, none of these valuation studies have addressed the influence of wider concerns such as respondents' awareness of climate change, their assumptions about the effectiveness of wind energy as an electricity source, their preference for alternative energy forms, or the relative strength of NIMBY-type opposition on stated preferences for wind farm installation. To account for these influences in a formal way, this paper attempts to develop a conceptual framework for tourists that systemises the multi-dimensional set of discourse-based drivers influencing preferences for the positioning of offshore wind farms. A more formal view on the constituents of tourist preferences is an important contribution to the existing literature, because local opposition to wind farms often related to the expected impact on local businesses and tourism (Dimitropoulos and Kontoleon 2009, The Economist 2010).

The paper is organised as follows. The next section provides a review of existing literature on preferences for wind power landscapes. We do this by exposing two key concepts, the 'green vs. green debate' and 'NIMBY'ism, which are prevalent in framing wind power debates. We also argue that explanations for opposition or support of wind farm positioning stretch beyond the postulates embedded in these concepts. In chapter 3, we review a set of discrete factors that that the literature has shown to play a role in shaping attitudes and preferences to wind farm proposals. In chapter 4 we develop a conceptual framework of postulated drivers of tourist preferences for the siting of offshore

[2] Following the French Grenelle forum and the adaptation of EU climate treaty, France has pledged to increase the share of renewables to 20% of the energy mix by 2020.

wind farms. The framework is tested on our empirical data (described in chapter 5) using a principal component analysis. The framework is subsequently used as covariates in a choice model of preferences for the siting of offshore wind farms. The results are presented, discussed and concluded upon in respectively chapter 6, 7 and 8.

2. Broad discourses in questions relating to wind farm siting

2.1 Green vs. green and NIMBYism

Scenic views are, for the most part, public goods in that they are non-excludable and non-rival. Industrial wind turbines are, by their nature, highly visible and have an unavoidable impact on scenic views. Addressing the concerns of those who do not find them aesthetically appealing is therefore a real challenge for developers and policy-makers (Jones and Eiser 2009). It is perhaps then unsurprising that existing research identifies the perceived aesthetic fit of turbines on a landscape as one of the strongest determinants of attitudes to wind farm proposals (Pasqualetti et al. 2002, Wolsink 2010, Jones and Eiser 2009, Groothuis et al., 2008), and the most important factor in explaining contrasting views on wind power installations (Ellis et al., 2007). At the same time, wind energy falls under the category of green energy, as it does not contribute to global warming or other negative externalities such as acid rain or decreased visibility (Kahn, 2000). Typically therefore, while opponents tend to express concern over impacts on landscape, noisescape and local wildlife, supporters tend to view wind turbine development as symbolic efforts to avert climate change and air pollution (Jones et al. 2011; Ellis et al. 2007). This apparent conflict in wind power debates has been termed the green vs. green debate (Warran et al. 2005; Groothius et al. 2008). The juxtaposition of wind energy as a local bad, but with features of global public good, is said to lead to high levels of general public support but frequent local opposition to actual development (Bell et al. 2005). That is, wind energy is accepted and embraced as long as it is not in my backyard (NIMBY). In the following chapter however, we argue that there is an increasing literature that illustrate that both support and opposition to the location of wind power facilities stretches beyond NIMBYism and the Green vs. Green debate.

2.2 Aesthetics, business interests and political conviction.

Recent research has argued that NIMBYism does not adequately explain the attitudes of opposition to local wind farms (Swofford and Slattery 2010, Wolsink, 2006, EK 2005, Devine-Wright 2005, Jones and Eiser 2009). An elaborate attempt to coherently explore citizen discourses on wind farm development is provided in Ellis et al. (2007), who investigate the discourses of supporters and objectors to a proposed offshore wind farm on the Tunes Plateau in Northern Ireland using the Q-Methodology[3]. With regard to objectors, Ellis et al. (2007) show that opposition to wind power developments does not always derive from a desire to protect a pristine natural environment from encroachment, but may derive from an overall scepticism of wind power, an impression of wind power as an expensive source of electricity, or inferior to conventional energy sources, sometimes coupled with a low priority given to climate change. Similar results have been reported elsewhere. In an English region subject to nine wind-farm proposals, Jones et al. (2011) showed that the more

[3] The Q-methodology permits to uncover patterns within and across individuals rather than across traits such as gender, age etc. (see Ellis et al. 2007).

favourably respondents felt towards existing coal and gas-powered generation activity, the fewer wind farms they endorsed. In Sweden, Söderholm et al. (2005) found that citizens who were willing to give up ‘economic benefits’ in order to gain ‘environmental benefits’ expressed a more positive attitude towards wind power than those who contested wind energy subsidies or taxes on competing power sources. As such, the question of support for renewable energy may be one of political stance regarding the extent to which governments should interfere in energy markets. The studies also confirm that opposition is not just grounded in ‘local’ consequences (aesthetics, wildlife, noise, etc), but that citizens are considering the opportunity costs of wind power projects when shaping their preferences.

Finally, there is substantial evidence that individuals who hold an ecological worldview, or regularly buy ‘green’ products, are more likely to accept local wind farm developments and the less likely to display NIMBY syndrome (Groothius et al., 2008, Söderholm et al. 2005, Jones et al. (in press)). Ellis et al. (2007) show that besides the ‘green considerations’, support may also be motivated by the expectation that a wind farm may yield local economic benefits and be of aesthetic value. Correspondingly, Swofford and Slattery (2010) stress that there is little evidence that wind turbines are universally perceived as unsightly, which suggests the green vs. green debate which informs NIMBYism may not always be at play.

3. Single based determinants of preferences and attitudes to wind power.

By reviewing the existing literature determinants of preferences and attitudes to wind farm siting, the following section provide evidence that support for or opposition against wind farms is influenced by the site-specific consequences of wind turbines, the context in which they are installed, personal experience with turbines, and the socio-demographic characteristics of those who are eliciting their preferences for them.

3.1 Physical and contextual factors.

What we may reasonably expect from the existence of Not-In-My-Backyard motives is that attitudes and preferences towards wind farms depends on their physical characteristics, and the context in which they are installed. In particular the height of the turbines, their size, the number of turbines and the landscape in which they are installed have been found as significant determinants (Devine-Wright 2011, Wolsink 2010, Van der Horst 2007). The distance of a wind farm from an individual’s residence also affects his/her likelihood to accept the facility, although the direction of change is not uniform across studies (Devine-Wright 2005, Ladenburg 2011, Swofford and Slattery 2010). While negative impacts on tourism revenues has been demonstrated when offshore wind farms are within the near viewshed, the disamenity costs decline with increasing distance from the shore (Krueger et al. 2011, Westerberg et al. 2012, Landry et al. 2012). Beyond the landscape context, resistance to wind power installations is also induced by concern over the impact on local ecosystems and the noisescape (Dimitropoulos and Kontoleon, 2009, Firestone and Kempton, 2007, Firestone 2009, Warren, Lumsden, O'Dowd, & Birnie, 2005).

3.2 Stake and Institutional structure

The institutional context in which a facility is being prepared and built is also of prime importance. In particular, it is argued that involving local citizens in the financial framework and the decision making process of wind farm positioning facilitates public acceptance of the project (Wolsink 2007, Rebel et al. 2011, Haggett 2011). More generally, preferences will vary, depending on the individual's stake in the wind farm and the area under consideration. For instance, with regard to the siting of an offshore wind farm in North Wales, Devine-Wright and Howes (2010) find that opposition is stronger when locals experience a strong sense of place attachment. Conversely, when it comes to tourists, Westerberg et al. (2012) found that loyal visitors to a coastal resort expressed smaller disamenity costs from a wind farm than tourists who were visiting the resort for the first time. This may be explained by the fact that tourists have a lower degree of place. Westerberg et al. (2012) also found that tourists who spend more time engaging in cultural, historical and gastronomic activities experienced smaller visual disamenity costs from wind farms relative to tourists who spend more of their time on the beach. Consequently, the stake that tourists have in a changing seascape also depends on how tourists allocate their vacation time-budget.

3.3 Socio-demographic factors and nationality differences

Socio-demographic factors have consistently shown to have a consequence on respondent preferences for wind farms (whether onshore or offshore). In particular, opposition to, or preference against wind farms is often found to correlate positively with age (Frantal and Kunc, 2010, Lilley et al., 2010, Ladenburg 2010, Westerberg et al. 2012; Molnarova et al. 2012) and income (Firestone and Kempton 2007, Lilley et al. 2010, Ladenburg 2010). Evidence on the impact of education on preferences for location of wind farms is meagre and mixed (Ladenburg, 2007; Molnarova et al, 2012; Krueger et al 2011). However Bergman et al. (2007) have shown that inhabitants in Scotland with higher levels of education are more likely to support renewable energy projects in general.

While we may expect differences in preferences around wind farms and wind power in general across nationalities, the empirical literature has paid scant attention to this topic. Our expectation is that the citizens of one country may have significantly different energy provision preferences than citizens from another country, owing to cultural circumstances and the prevalence of trust in government and democratic institutions. This hypothesis is supported by evidence that attitudes towards wind farms alter as individuals interact with family, friends and neighbours (Johansson and Laike 2007), and that an individual's opinion tends to converge on the overall opinion of the community in which he/she lives (Jones and Eiser, 2009). In a cross-country study, Tjernstöm and Tietenberg (2008) find that a population's trust in government, the prevalence of democratic institutions and concern over climate change translate into lower national greenhouse gas emissions. To the extent that concern about climate change varies from one country to another, we also expect that attitudes to wind energy may vary from one country to another.

3.4 Experience

Personal experience with wind turbines has been found to have a bearing on preferences for additional installations (Krueger et al 2011; Molnarova 2012; Ladenburg 2010; Johansson and Laike

2007). Ladenburg (2011) provides a thorough review of exiting studies on how different types of prior experience affect preferences for wind farms both onshore and offshore. Depending on the study, the results show that previous experience with wind energy installations may facilitate acceptance, rejection, or indifference towards additional wind farms. However, the overarching conclusion is that the impact of onshore wind turbines on the viewshed leads to reduced support for additional onshore wind power development, whilst offshore viewshed effects have no impact on the support or opposition to additional offshore development.

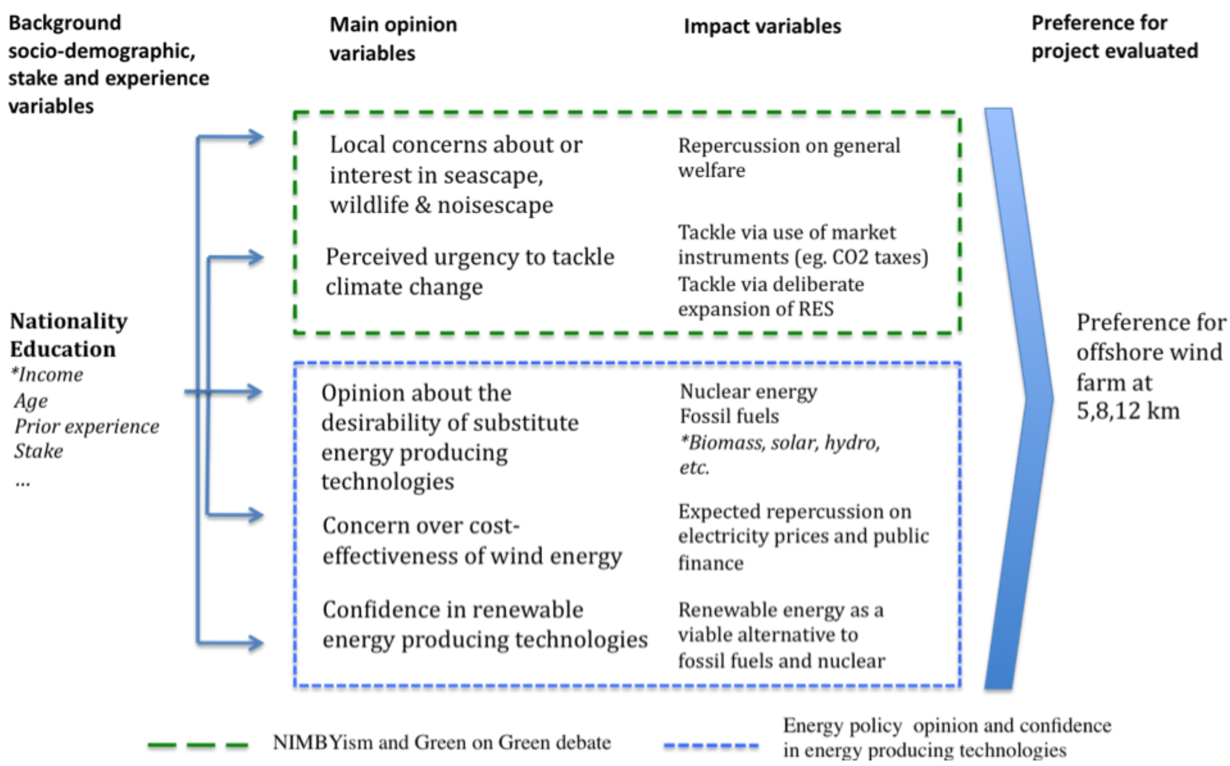
3.5 Summary of the literature

The studies mentioned above provide evidence that support for or opposition against wind farms is influenced on the site-specific consequences of wind turbines, and the context in which they are installed. However citizens are also considering the opportunity costs of employing wind power more broadly, both in regard to local business interests and public funds. These opportunity costs refer to the perceived benefits or pitfalls of alternative energy producing technologies and the overall cost burden to society (of government support schemes for renewable energy). How the citizen perceives these opportunity costs depends on their political conviction, socio-psychological and socio-demographic traits. We would also argue that despite an accumulating body of literature on parameters, which affect attitudes and preferences around wind power, the evidence so far represents rather fragmented 'snap-shots' of impact variables. The literature thus fails to provide an overall representation of dominant opinion-based discourses (identified in section 2) that citizens may hold. As far as the authors are aware, no study to date has captured the impact of actual discourses on monetarised welfare estimates associated with the establishment of wind farms. To confront these shortcomings, chapter 4 presents a conceptual framework to help in understanding discourse-based drivers of opinions around offshore wind farms for non-residents/tourists.

4. Conceptual framework of drivers of preferences for offshore wind farm locations

On the basis of above exposition, supplemented with internet research of wind power interest groups, stakeholder interviews, and through conducting focus groups, we developed a conceptual framework that schematizes the expected make-up of tourist preferences for the establishment of offshore wind farms (at 5,8 or 12 km from the coast).

The framework (fig 1) presupposes that respondents hold one or several of the 'main opinion variables' relating to the tourist's perception and attitudes towards the local impact of wind farms, climate change and alternative energy sources. These opinion variables are articulated through expected impact variables. Consequently, we stipulate that the tourist attempting to make a visual judgement about a wind farm will assess local consequences against what they perceive as global costs and benefits. By local consequences, we refer to perceived aesthetic intrusion or enrichment of their vacation destination, expected noise and wildlife interference. Global impacts on the other hand, refer to the tourist's perceptions about the need for urgent action on climate change and the role that renewable energies may play in this; the tourist's perceived threat of nuclear energy and the role that wind energy may play in reversing reliance of nuclear derived electricity; and the tourist's expectation about the impact of wind power development on public finance and consequent changes in electricity prices or taxes. The framework presupposes that each of these opinion variables hold direct implications for how the visual impact of the wind farm is evaluated at 5, 8 and 12 km distance from the shore. This presupposition is consistent with a body of literature, which argues that there are personality, habitual, sexual, national, and cultural differences in the perception and appreciation of landscapes (Gee and Burkhard 2010; Eleftheriadis et al 1990). A further implication is that the beauty or unsightliness of a landscape need not be objectively defined per se, and that an individual's evaluation of the landscape ultimately depends on the associations they make with that which they observe. Lastly, the framework also allows for incorporation of socio-demographic traits such as the nationality of the respondent, age, education and prior experience with wind turbines. In particular, we assume that the main opinion variables are correlated through these background variables, and that these should be included in a statistical analysis to uncover non-belief based sources of preference heterogeneity.



*Variables written in italics have either not been collected for the purpose of the present analysis, or were not significant in the final model due to a high correlation with other background variables.

Figure 1: Conceptual framework of key discourse-based drivers of preferences for wind farm project

5. Case, materials and methods

5.1 The Languedoc Rousillon case study

Languedoc Rousillon is in Southern France and benefits from an annual average of seven hours' sunshine per day, 200 km of sandy beaches, a hinterland of unspoilt and varied countryside, and distinctive cultural and architectural monuments (Klem, 1992). The coastal Languedoc Roussillon is characterised by the spatial concentration of tourist community resorts, making the region the fourth most important tourist region in France (Klem, 1992; Lecolle, 2008). Languedoc Rousillon has also been identified for its great offshore wind power potential, due to regular and strong winds and a large, shallow continental plateau[4] (BRL 2003). As a consequence, attention was drawn to Languedoc Rousillon when the French Government committed to more than double its share of renewable energies by 2020, under the EU Climate and Energy package and the Grenelle Forum (Enerzine, 2011; GWEC, 2011). Reaching a target of 23% renewable energy by 2020 will necessitate the installation of 6 GW of wind power along the Mediterranean and French Atlantic coastlines (CleanTechnica, 2012). Whereas the fishing industry constitutes the primary source of opposition in the Atlantic regions, wind power projects in the Mediterranean have been stalled primarily due to fear of the potential negative impact on tourism (Cabanis and Lourie 2011). Coastal municipalities argue that wind turbines would disfigure the landscape and hereby destroy the attractiveness of their tourist resorts (Guipponi, 2011). However, little is known about the post-construction effect of offshore wind farms on tourism, especially in regard to destinations characterised by high-density sun and beach tourism, where turbine visibility is significant (Westerberg et al. 2012). In the perspective of a potential invitation to tender for the construction of offshore wind farms in Languedoc Rousillon (Agasse 2010), it was considered pertinent to inform the tourist industry and wind farm developers about the economic costs or benefits to the tourist industry that might result from the implantation of offshore wind farms in the French Mediterranean. To investigate this, we conducted a choice experiment valuation survey with tourists on the coast of Languedoc Roussillon and elicited willingness to pay / willingness to accept compensation for wind turbines at different distances from the shore. The results, with direct implications for the tourist industry, are discussed in Westerberg et al. (2012).

5.2 Survey development

The CE survey design commenced early 2010 with a series of meetings with chambers of commerce and industry, regional and departmental committees for tourism and with professionals in the wind power and tourist industry. This background helped in sketching a series of pertinent attributes to be valued. These were narrowed down and further defined in three focus groups held with both international and French national tourists. The selected attributes were wind farm placement at different distances from the shore, with or without wind farm associated recreational activities,[5] the presence or absence of a coherent environmental policy at the coastal tourist communty, and an increase in the weekly overnight expense. Further description of the attributes and their levels are provided in table 1 and Westerberg et al. (2012).

The final survey instrument had 6 sections. It began with eliciting respondents' perceptions of the aesthetic and environmental risk of wind farms; concern about climate change; feelings of personal responsibility and perceptions about the efficiency of wind power compared to other energy sources, offshore versus onshore, etc. The second section constituted a couple of simple questions regarding

[4] Wind farms yield the highest net revenues if located in areas with high wind speeds, low average depths of the seafloor and at a short distance from the shore (Punt et al., 2009).

[5] Offshore wind farms act as no-take zones for fish (Punt et al. 2009), the eco-design of wind turbine foundations or the installation of artificial reefs around turbine foundations, serve to create fish habitat and hereby permit to boost tourism and leisure activities, such as diving, angling and observational boating (LaCroix and Pioch 2011).

the mode of respondent’s vacation; the length; with whom they were travelling; accommodation type and price. The respondents were then presented with an A3 info-sheet with photos and explanations of the policy relevant attributes of various wind farm scenarios (described in table 1). These served to familiarise the respondents with the subsequent 8 choice set questions. In each (A4 page) choice set the respondent was asked to elicit his or her preferred destination between A and B, or “none of them” if neither destination A or B was preferred relative to his current vacation location (which has neither a coherent environmental policy, offshore wind farm or associated recreational activities). Photo simulations of wind farms were made using the professional photo simulation program, ‘WINDPRO version 2.7’ with typical August lighting conditions at midday. Figure 2 depicts an example of a choice set with the wind farm simulation at 5 and 8 kilometres. The fourth section of the survey instrument followed up on the choice-set questions in order to identify protest bidders. The fifth section asked about respondents’ motivation for visiting to the Languedoc Rousillon and their overall satisfaction (or dissatisfaction) with the tourist resort. The final section elicited respondents' social, economic and attitudinal characteristics (table 2).

Attribute	Level	Attribute		Attribute description as in questionnaire
Wind farm	No Yes 5,8,12 km			A single offshore wind farm of 30 wind turbines can furnish electricity of up to 115,000 households. However, it may be contested on visual grounds. To minimise potential visual nuisances the wind farms can be entirely avoided or placed further offshore. Placing them further offshore is however a more costly option. Distances of 5 km, 8 km and 12 km from the coast corresponds to wind farm projects currently or previously proposed in the Mediterranean.
		Wind farm associated recreational activities	No Yes	A range of recreational activities can be associated with the wind farm itself or nearby structures. The implantation of artificial reefs and the eco-design of turbine foundations may create new habitats for fish, crabs, mussels, lobsters and plants, creating a more diverse and dense population of marine life at wind farm sites than surrounding control sites. This will open up for a range of recreational activities such as sea-safaris, diving and angling.
Coherent environment al policy	Yes No			Coastal municipalities may minimise their impact on the environment by adopting a coherent environmental policy. An example of an environmentally responsible sustainable tourist resort, is one which: Favours the use of local and organic produce; limits the circulation of speed boats and scooters at sea; favours public transport on-shore; has an extended network of bicycle lanes; favours solar panels, energy and water saving devices and is equipped with adequate waste and sewerage facilities.
Price	[- 200, -50, -20, -5, +5, +20, +50, +200]			Change in weekly accommodation price relative to status quo (where the tourists were vacationing during the interview).

Table 1: Description of attributes

6 Data analysis

Our data analysis consists of two parts – a principal component analysis (PCA) and a choice experiment where the output from the PCA is used.

6.1 Principal component analyses

Thurstone (1931) was the first to introduce the term factor analysis, which is a multivariate exploratory technique that can be used to examine a wide range of data sets (Börner et al. 2003). A key method in factor analysis is Principal Component Analysis (PCA). PCA is used to transform a number of (possibly) correlated variables into a (smaller) number of uncorrelated variables called principal components. Uncorrelated components can be used as interaction terms in further statistical analysis, as is our case. In correspondence with our conceptual framework, thirteen attitudinal variables (Appendix 1) were considered pertinent to our principal component analysis. Formally presented, the first PC is given by the linear combination of the variables $X_1, X_2, \ldots X_P$.:

$$PC_1 = \beta_{11}(X_1) + \beta_{12}(X_2) + \ldots \beta_{1p}(X_p) = \sum_{p=1}^{p} a_{1p} x_i$$

$$\vdots \qquad \text{eq. 1}$$

$$PC_J = \beta_{J1}(X_1) + \beta_{J2}(X_2) + \ldots \beta_{Jp}(X_p) = \sum_{i=1}^{p} a_{Ji} x_i$$

Where PC_J is the subject's score on principal component J, β_{jp} is the regression coefficient (or weight) for observed attitudinal variable X*p*, across the j=1…J potential principal components. The first principal component is calculated such that it accounts for the greatest possible variance in the data set. The regression weights (β_{jp}) are determined using an eigenequation[6] such that for a given set of data no other set of weights could produce a set of components that are more successful in accounting for variance in the observed variables. Subsequently it looks for a second linear function PC_2 uncorrelated with PC_1, having maximum variance, and continues until the m'th stage (where $m \leq J$) when a total of *J* uncorrelated principal components have been calculated. Eigenvalues are the variance explained by each principal component, and are constrained to decrease monotonically from the first PC to the last. We have followed the general rule that only PCs with an explained variance of over 1 are retained (Jolliffe, 2002). As shown in section 6.4.1, this led to the identification of m = 4 PCs. We defined J = m = 4 in order to avoid the influence of different magnitudes or variances of variables. The PCs are rotated using a orthogonal (varimax) rotation, which simplifies the factor structure and makes its interpretation easier and more reliable (Abdi 2003). For a detailed treatment of principal component analysis, we refer the reader to Harman (1976), Smith (2002), Abdi (2003), and Jolliffe (2002). So far, PCA, has been used only a handful of times, to assess heterogeneity in stated preference methods (Boxall and Adamowicz, 2002; Nunes and Schokkaert, 2003; Karousakis & Birol, 2008; Kontoleon and Yabe 2006).

6.1.1 Opinion and attitudinal variables

A comprehensive set of attitudinal statements was used in order to assess the tourist's opinion about energy policy, climate change, the effectiveness of wind power and renewable energy. Respondents were asked to rate (or agree or disagree with) each question. Some questions contained a 5-point linkert scale and others a 3-point linkert scale. To counteract that a variable has a higher variance than another, simply due to its linkert scale, all responses were recoded to a 3-point scale[7]. Furthermore, to get the same meaning for all labels, negative statements were reversed for the analysis. The list of the attitudinal statements and their scale is found in appendix 1.

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[6] PCA finds the eigenvector β that maximises the variance given the constraint that $\sum_{i=1}^{I} \beta_{jp}^2 = 1$ (Lewis-Beck, 1994)

[7] Likert scales are interval scales and hence linear transformations do not 'destroy' the properties of the scale.

6.2 Econometric Specification of the choice experiment

To describe discrete choices in a utility maximising framework, the CE employs the behavioural framework of random utility theory (RUT). When the relationship between utility and characteristics is linear in the parameters, the individual *i*'s utility *U* from alternative *j* is specified as:

$$U_{ij} = V_{ij} + e_{ij} = V(X_{ij}, S_i, P_i) + e_{ij} \qquad (1)$$

where V_{ij} is the systematic and observable component of the latent utility and ε_{ij} is a random component assumed IID and extreme value distributed (Louviere et al., 2000). The choice of one alternative (*j*) over another alternative is a function of the probability that the utility associated with *j* is higher than that associated with other alternatives. In this case, the probability of any particular alternative *j* being chosen can be expressed in terms of a logistic distribution and Equation 1 can be estimated with a conditional logit model (CLM) (Greene, 2003), which takes the general form:

$$P_{ij} = \frac{e^{V_{ij}}}{\sum_{h \in C} e^{V_{ih}}} \qquad (2)$$

It is possible to allow for preference heterogeneity, e.g. through a random parameter logit model. In this study however, we are interested in looking at how much heterogeneity can be explained by the latent factors from the PCA and therefore we opted for the use of a simpler conditional logit model[8]. In particular we interact the factor components from the PCA (P) and socio demographic characteristics (S) with wind farm distance attributes. Because the factor components are latent, we do not bias the estimates in the conditional model.

While we test different specifications of the deterministic part of the utility function, specified to be linear in the parameters, the most elaborate one presented in Section 7 takes the following form:

$$\begin{aligned} V_{ij} = {} & \beta_{ASC} + \beta_1 X_{WF\text{-}5km} + \beta_2 X_{WF\text{-}8km} + \beta_3 X_{WF\text{-}12km} + \beta_4 X_{Reef\ Rec} + \beta_5 X_{Env.policy} + \beta_6 X_{Cost} + \\ & \delta_7 (X_{WF\text{-}5km} \cdot P_{WF\text{-}INEFFICIENCY}) + \delta_8 (X_{WF\text{-}8km} \cdot P_{WF\text{-}INEFFICIENCY}) + \delta_9 (X_{WF\text{-}12km} \cdot P_{WF\text{-}INEFFICIENCY}) + \\ & \delta_{10} (X_{WF\text{-}5km} \cdot P_{PRO\text{-}RES}) + \delta_{11} (X_{WF\text{-}8km} \cdot P_{PRO\text{-}RES}) + \delta_{12} (X_{WF\text{-}12km} \cdot P_{PRO\text{-}RES}) + \\ & \delta_{13} (X_{WF\text{-}5km} \cdot P_{CLIMATE}) + \delta_{14} (X_{WF\text{-}8km} \cdot P_{CLIMATE}) + \delta_{15} (X_{WF\text{-}12km\ t} \cdot P_{CLIMATE}) + \\ & \delta_{16} (X_{WF\text{-}5km} \cdot P_{NIMBY}) + \delta_{17} (X_{WF\text{-}8km} \cdot P_{NIMBY}) + \delta_{18} (X_{WF\text{-}12km\ t} \cdot P_{NIMBY}) + \\ & \delta_{19} (X_{WF\text{-}5km} \cdot S_{NORTH\text{-}EUR}) + \delta_{20} (X_{WF\text{-}8km} \cdot S_{NORTH\text{-}EUR}) + \delta_{21} (X_{WF\text{-}12km\ t} \cdot S_{NORTH\text{-}EUR}) + \\ & \delta_{22} (X_{WF\text{-}5km} \cdot S_{HIGHER\text{-}EDUC}) + \delta_{23} (X_{WF\text{-}8km} \cdot S_{HIGHER\text{-}EDUC}) + \delta_{24} (X_{WF\text{-}12km\ t} \cdot S_{HIGHER\text{-}EDUC}) \end{aligned} \qquad (3)$$

The β_{ASC} is the parameter for the alternative specific constant (ASC), which accounts for variations in choices that are not explained by the attributes or socio-economic variables. The vector of

[8] For reviewer purposes we have included a RPL model in the extra material, which shows that the mean of the four principal components interacted with wind farm placement, display the same significance as in the CLM.

coefficients $\beta_{1...}$ β_K and $\delta_{1....}$ δ_m is attached to a vector of attributes (X) and interaction terms (XS and XP) that influence utility respectively. P is a vector of variables that factored together[9] in the principal component analysis and S is a dummy variable equal to 1 if the respondent was of Northern European origin or had a higher education level. As the focus of this paper is on the determinants of preferences for the siting of wind farms, P and S were only interacted with the wind farm attribute. Given that opinion, psychometric and socio-demographic characteristics (S and P) are constant across choice occasions for any given respondent they can only enter as interaction terms with the management attributes.

The Willingness to Pay (WTP) or Willingness to Accept compensation (WTA) is estimated by the marginal rate of substitution (MRS):

$$MRS = -\frac{\beta_k}{\beta_P} \qquad (4)$$

where β_k refers to the parameter of interest and β_P to the parameter for price. In order to calculate standard errors for the WTP, the Delta method (Greene, 2002) is used.

Background socio-demographic characteristics	Description	Present in final model	Mean % (st. dev)
Higher Education	Has done at least 2 years of university studies	X	51%
Northern European	Of Scandinavian, English, Belgian, German, Swiss, Luxembourgian or Dutch origin.	X	26%
International tourists	Of any origin other than French		27%
See wind turbines daily	The tourist sees wind turbines daily, for example during his trip to work.		32 %
Net household income	In intervals of € 500 per month (min €0, max €>7000)		€ 2500 - € 3500
Age	Age (min 17 yrs, max 81 yrs)		37 years (14.6 years)
Female			59%

Table 2: Socio-demographic characteristics

6.3 Choice experimental design

With 8 payment levels[10] and three policy attributes, two of which have two levels while another has four, a full factorial design would have resulted in a total of 256 alternative management combinations. As this would constitute an unreasonably large design in practice, we asked respondents to evaluate 8 choice sets that were determined through the use of a fractional factorial design assuming an MNL model with priors ($\beta \neq 0$) obtained from a pilot study. The design was d-error minimised by Ngene (ChoiceMetrics 2010), with a resulting MNL d-error of 0.1085.

[9] Variables were considered as factoring together when the relative magnitude of factor loadings for each principal component was at least 0.4.

[10] While the status quo levels were included in the design for all other attributes, this was not the case for the monetary attribute. Hence, the "no change in price relative to today" option was not included in the design.

6.4 Results

6.4.1 PCA Results

The principal component analysis was undertaken using the principal factor extraction method in SAS 9.2 and varimax rotation. Based on a scree-test and the eigenvalue-one criterion (Kaiser, 1960)[11], four PCs were retained, accounting for 49% of cumulative variance. Loadings above 0.40 were considered as factoring together (Harman, 1976). Although it is often recommended that retained PCs should account for a minimum of 70% of total cumulative variance, lower percentages in the order of 50% can serve as an adequate summary when each component has interpretive meaning that makes sense in terms of what is known about the constructs under investigation (Everitt and Dunn, 1991). The PCs have been named on the basis of the variables that factored together, as well as the relative magnitude of the factor loadings. The 1st PC, labelled **"Wind Power inefficiency",** consists of those questions that refer to the perception that wind power is an inefficient technology, with consequences for the price of electricity, and for public finance. The 2nd PC, labelled **"pro renewable energy sources (RES)"** reveals a desire to see the phase out of nuclear and fossil fuels, and the belief that renewable energies offer a viable substitute to these conventional fuels. The 3rd PC labelled '**NIMBY syndrome'** consists of questions representing explicit concern about wind power development on the local environment with respect to the seascape, noise and aquatic marine life. The 4th PC, '**climate change concerned'** includes the conviction that climate change is a serious problem; that efforts should be taken to reduce climate change and that fossil fuel consumption should be subject to a CO2 tax.

[11] Kaiser's criterion states that components with eigenvalue above 1 should be retained. However, we excluded factor 5 with an eigenvalue of 1.02, on the basis of the scree-test. KAISERS CRITERION: Since each observed variable contributes one unit of variance to the total variance in the data set, any component that displays an eigenvalue greater than 1.00 accounts for a greater amount of variance than had been contributed by one variable. Such a component is therefore accounting for a meaningful amount of variance, and is worthy of being retained.

	WIND POWER INEFFICIENCY	PRO-RES	NIMBY SYNDROME	CLIMATE CHANGE CONCERN
Electricity prices will increase as wind power increasingly penetrates the energy market	75*	-14	-1	-7
General taxes will increase as wind power increasingly penetrates the energy market	68*	-7	14	-3
Wind power is an inefficient source of electricity	55*	-7	11	-6
Renewable energies offer a viable substitute to **fossil fuels**	-30	72*	-5	0
Renewable energies offer a viable substitute to **nuclear energy**	-5	63*	21	4
Avoid use and development of fossil fuel sourced energy	-13	58*	-20	23
Avoid use and development of nuclear energy	37	50*	-30	-9
Offshore wind farms have a negative influence on the seascape	8	-14	52*	-6
Offshore wind farms have a negative influence on life in the sea	4	-5	69*	0
Offshore wind farms have a negative influence on noise levels	12	16	74*	5
The introduction of CO2 taxes is desirable	-1	21	-20	60*
Climate change is a problem that should be taken seriously	-13	2	16	67*
Efforts should be made to significantly reduce CO2 emissions in my country	-3	-4	-1	82*
Eigenvalues	**2.29**	**1.53**	**1.30**	**1.24**
Variance explained by each factor	**1.62**	**1.61**	**1.57**	**1.55**
Cumulative variance	**0.18**	**0.29**	**0.39**	**0.49**

The printed values of the loadings are multiplied by 100 and rounded to the nearest integer. Values greater than 0.49 are flagged by an '*'. The questions underlying the PCA are simplified, see appendix X for the actual phrasing used in the questionnaire.

Table 3: Rotated factor Pattern

6.5 Choice experiment results

6.5.1 Parameter estimates

2712 choices elicited from 332 respondents were analysed using NLOGIT version 4.0. Two models were specified - a CLM with interactions between the wind farm management attribute and socio-psychometric constructs captured in the PCs, and socio-demographic dummies and a simple CLM for comparison. A Random Parameter Logit specification was also estimated, and yielded similar results. As we are interested in interactions per se, we chose to employ a simpler model. The estimates on the tourist sample for the CLM without interactions are reported in table 4. They reveal that wind farm associated reef recreation, the presence of a coherent environmental policy and the presence of wind farms are all significant factors in choosing a coastal tourist destination. It is also clear that the overall fit of the model, as measured by the adjusted McFadden's $\rho 2$ of 0.17, is good by conventional standards used to describe probabilistic discrete choice models (Ben-Akiva and Lerman, 1985; Louviere et al., 2000).

The parameter estimates reveal that the experienced visual disamenity costs decrease as the wind farm is situated further from the coast, and that disamenity costs associated with a wind farm at 5,8 or 12 km may be fully compensated for by the presence of a coherent environmental policy or wind farm associated recreational activities. Some debate surrounds how to interpret and use the alternative specific constant, when deriving welfare scenario estimates (Boxall et al., 2009). Since the parameters for the alternative specific constant (ASC) are equal to those of the status quo, and are negative and significant, it either means that the tourist sample has a negative utility associated with the current situation or experiences a positive utility from any move away from the status quo. We consider the latter explanation more appealing than the former, given that the tourists by definition should be enjoying a welfare benefit from their vacation and not the opposite. This interpretation has implications for our scenario estimates and discussion in sections 6.6 and 7.

The conditional logit model with interactions is similarly displayed in table 4. In this model, the wind farm attributes interact with the four components derived from the PC analysis, as well as two socio-demographic dummies; namely whether the respondent has a higher university degree or is of Northern European nationality (rather than French). Seeing wind turbines daily, being a higher income earner, and age were similarly significant determinants of wind farm preferences. However, we found that the effect of these characteristics were insignificant when considered within the context of the nationality and education level of the respondents[12]. Consulting table 4, we see that the main parameter estimates display the same pattern as the simple CLM. However when accounting for socio-demographic and opinion related variables, wind farm installation at 12 km from the coast is a source of disutility to the respondent who does not hold the characteristics specified in the interaction terms.

[12] This is because, in this survey, being Northern European implies having more experience with wind turbines, and having a higher mean income than their French counterpart. The Northern European dummy therefore captures in part the effect of experience on preferences for the siting of wind farms.

	CLM Model			CLM with interactions		Marginal WTP	
FIXED PARAMETERS	β	t-value		β	t-value	€	
Alternative Specific Constant	-0.59	(-6.3)	***	-0,61	-6,5***	-39.2	[-51;-27]
Coherent environmental policy	1.47	(17.7)	***	1,49	17,7***	95.2	[88;103]
Artificial reef-associated recreation	0.70	(10.2)	***	0,71	10,1***	45.2	[37; 53]
Wind farm 5 km	-1.83	(-15.5)	***	-2,19	-15,6***	-140.0	[-154;-126]
Wind farm 8 km	-1.07	(-10.3)	***	-1,31	-10,2***	-83.9	[-99;-69]
Wind farm 12 km	-0.13	(-1.4)		-0,27	-2,2**	-17.0	[-32;-2]
Cost	-0.02	(-22.8)	***	-0,02	-22,9***		
INTERACTIONS (OBSERVED HETEROGENEITY)							
Wind Power Inefficiency*WF 5 km				-0,17	-2,6 ***	-10.7	[-19;-3]***
Wind Power Inefficiency*WF 8 km				-0,21	-3,1 ***	-13.6	[-5;-22]***
Wind Power Inefficiency*WF 12 km				-0,07	-1,0	-4.2	[-12;4]
Pro RES*WF 5 km				0,14	2,2 **	8.9	[1;17]**
Pro RES*WF 8 km				0,12	1,7 *	7.6	[-1;16]*
Pro RES*WF 12 km				-0,06	-0,9	-3.7	[-12 ;5]
NIMBY*WF 5 km				-0,37	-5,6 ***	-23.4	[-32;-15]***
NIMBY*WF 8 km				-0,16	-2,3 **	-10.0	[-19;-1]**
NIMBY*WF 12 km				-0,21	-3,3 ***	-13.6	[-22;-5]***
Climate change concern*WF 5 km				0,22	3,5 ***	14.0	[6;22]***
Climate change concern*WF 8 km				0,16	2,3 **	10.2	[2;19]**
Climate change concern*WF 12 km				0,06	0,9	3.9	[-4;12]
Northern European*WF 5 km				0,72	4,8 ***	46.3	[27;65]***
Northern European*WF 8 km				0,39	2,4 **	24.7	[4;45]**
Northern European*WF 12 km				0,19	1,2	12.3	[-7;32]
Higher education*WF 5 km				0,26	2,0 **	16.6	[0;33]**
Higher education*WF 8 km				0,28	2,0 **	18.0	[0;36]**
Higher education*WF 12 km				0,17	1,3	11.1	[-6;28]
Final log-likelihood:	-2370.9			-2305.9			
Likelihood ratio test:	1346		-	1342.5			
Adjusted rho-square:	0.170			0.187			
BIC	1.76888			1.7786			
Number of observations	2712			2712			
Number of individuals	337			337			

t-statistics are in parentheses.
*denotes significance at 10% level. **denotes significance at 5% level. and ***denotes significance at 1% level. WTP is calculated using eq. X and refers to the WTP for the average respondent in the CLM 2 model. The lower and upper bounds for 95% confidence intervals are calculated using the delta method and reported in the brackets.

Table 4: CLM results

Considering at first the principal component interactions, we can see that the results are in correspondence with our hypothesis. Perceived inefficiency of wind power, and NIMBY-attitudes, increase the experienced disutility from holidaying in proximity to a wind farm. In contrast, concern about climate change, confidence in renewable energies and aversion towards nuclear and fossil fuel sourced electricity, serve to lessen the disutility experienced when a wind farm is located in the near viewshed (at 5 and 8 km from the coast). In concrete terms, judging from parameter estimates, NIMBY type attitudes are stronger determinants of experienced disutility than the perceived inefficiency of wind power. As for the utility enhancing components, the perceived urgency of tackling climate change reduces the negative welfare impacts of wind turbines to a greater extent than aversion to nuclear and fossil fuels. It is noteworthy that being of Northern European nationality, as opposed to of French nationality, is the single most important determinant of differences in preferences for the siting of offshore wind farms. Northern Europeans, as well as more highly educated respondents, are less sensitive to the installation of offshore wind farms at 5 and 8 km from the coast. When a respondent possesses both these characteristics, the average compensation requirement is significantly reduced.

6.6 WTP estimates

Having defined the most appropriate model, a WTP measure for changes in coastal destination characteristics may be obtained by converting parameter estimates into marginal rates of substitution, according to equation 4. These, and their corresponding confidence intervals are reported in the last column of table 4. Consulting the table we see that those respondents who hold none of the characteristics specified in the interactions, require an average compensation of 140€ per week per adult to be willing to holiday at a coastal tourist resort with a wind farm at 5 km from the coast. However, the presence of a coherent environmental policy and wind farm associated recreational activities, worth respectively 95€ and 45€, more than compensate for the visual nuisance experienced by the presence of the wind farm at 5, 8 or 12 km. By further accounting for the fact that the ASC is negative and significant, it becomes clear that wind farm eco-design associated recreational activities alone can compensate for the visual nuisance imposed by the wind farm, when the facility is installed 8 km from the shore (39€ + 45€ - 84€ = 0).

Considering WTP and WTA estimates in the light of the typologies of the tourists captured in the principal components, we can see that when the development of wind power is perceived as costly to society, respondents experience an increase in disutility from holidaying at a coastal community resort with an offshore wind farm. This disutility translates into an additional 10€ to 14€ weekly compensation requirement respectively when the wind farm is located 5 to 8 km from the shore. When the respondent holds NIMBY-like attitudes, the additional compensation requirement is in the order of 23€, 10€, and 14€ for turbines located offshore by 5,8 or 12 km respectively. If an individual is keen for society to engage in efforts to reduce climate change, his or her compensation demands for a wind farm in the near viewshed drop by about 10€ to 14€ (or about 10-12%), compared with the respondent who is not concerned about climate change. In a similar sense, we can see that aversion to fossil fuels and nuclear energy, and simultaneous confidence in the ability of renewable energies to substitute these fuels, translates into a compensation requirement of 130€ (rather than 140€) and 71€ (rather than 84€) when the wind farm is sited 5 and 8 km from the shore respectively. It should be born in mind that such respondent characteristics will typically co-exist with one or several of the other interactions (such as having a higher education and being concerned about climate change), which render the necessary compensations even lower. When a wind farm is located 12 km from the shore, the preferences of those concerned about global warming or conventional energy are not significantly different to those who are not as concerned.

Lastly, we observe that Northern European tourists would require almost 50€ less (33% less) in compensation than their French counterparts when a wind farm is installed 5 km from the shore. When the wind farm is installed at 8 km from the shore, the compensation requirement is likewise about one third less for the Northern European respondents. Higher education also plays a role in reducing the perceived visual nuisances, of an order of about 12% to 20% less when a wind farm is installed at 5 km to 8 km from the shore.

7. Discussion

Several interesting remarks can be made in regard to above results. Firstly, with respect to the PCs and the socio-demographic characteristics, the results point to little divergence in opinion about the installation of a wind farm 12 km from the coast. The interaction term relating to NIMBY associated opinions is the only such term that is significant when considering the 12km distance. This result suggests that locating wind turbines further offshore has little effect on perceptions about wind farms' intrusion on the landscape, noise pollution, or damage to wildlife.

Secondly, placing a wind farm 12km from the coast influences preferences very little either for those who consider wind power to be 'a blow to ratepayers, businesses, and municipalities who are being asked to bear billions of dollars in new electricity costs' (Alliance of Nantucket Sound 2011), or for those who do not consider wind power a costly technology. This is rather surprising, since the installation, operation and maintenance costs rise with increasing distance from the coast (Möller et al. 2012)[13]. One may thus stipulate that the higher perceived visual nuisances of wind farms in the near viewshed result from a combination of the proximity of the wind farm to the shore, and the perceived inefficiency of the technology.

Thirdly, our principal component interactions show that concern over climate change, nuclear energy and the cost-effectiveness of wind power are important determinants of the welfare impacts that individuals experience when vacationing in proximity to an offshore wind farm. This is noteworthy given that we were eliciting respondent preferences for wind farms captured in photo illustrations (figure 2). The results point to the fact that although we may think that we are eliciting preferences for 'objective' physical characteristics of a landscape, the elicited preferences are inherently shaped by 'political, technical, economic or ecological' implications of the object or landscape under consideration (Westerberg et al. 2010). In particular, the results lead us to postulate that the perceived such implications of wind energy may be at least as significant in shaping preferences as the physical characteristics of that which is being valued. This is a novel contribution to the existing welfare economic literature on preferences for wind farms.

Finally, our results indicate that nationality stands out as a significant determinant of tourist preferences regarding the location of offshore wind farms. In particular, the presence of an offshore wind farm compromises the welfare of Northern European tourists (majority German) significantly less than that of their French counterparts. This is particularly noteworthy given that we have controlled for other factors, such as the desire to phase out nuclear, or concern about climate change. In this regard, it is not unreasonable to consider that adherence to a certain energy orientation (e.g. towards renewables) is dependent on the energy policy pursued in the respondent's country of

[13] Installation, operation and maintenance *costs* are a function of *distance* to service harbour and the depth of the sea (Möller et al. 2012). All the tourists were told during the interview that the cost of wind farm installation increases with distance, and hence that no wind farm in the Languedoc Rousillon region can be envisaged further than 12km from the shore.

residence. This hypothesis is supported by empirical observations. German energy policy, for example, is being increasingly dominated by a diverse and growing group of renewable energy supporters who enjoy broad political and public support. These forces have convinced the Merkel government to transform the nuclear and fossil-fuel dominated energy system into one based predominantly on renewable energy sources (Bossen 2012). In contrast, in an article titled "France and renewable - a not so passionate love-affair", Saint Jacob (2008), describes how the French public, economists, scientists, or planners in France are little convinced of the benefits renewable energy. Correspondingly, the BBC has labelled France as Europe‘s most enthusiastic devotee of nuclear power (BBC world, 2009).

What do the above observations imply for overall welfare estimates? Assuming someone is of Northern European nationality, has a high level of education and is concerned about climate change, the compensation requirements associated with the installation of a wind farm 5 km from the shore will be of an order of approximately 24€ / week (-140€ + 14€ + 46€ + 9€ + 17€ + 39€[14]). As such, we may conclude that even for the 'globally concerned highly educated' tourist, wind farms in the near viewshed are still associated with some disutility, and prompt demand for compensation. In trying to explain the source of this disutility and general resistance to renewable energy installations, Sovacool (2009a: p4510) argues that unlike current energy production and use, "most renewable power generators concentrate all of their externalities in one point, rather than distributing them over a vertically complicated fuel cycle (as nuclear and conventional units do)". Coupled with this, a slow and subtle shift to modern-day natural gas or electric heaters has reduced almost all human involvement in the production of heat to the mere flicking a switch (Sovacool 2009b).

As conventional electricity production units are for the majority 'out-of-sight', they are also 'out-of mind'. In contrast, decentralised renewable energy facilities, scattered in the landscape, are more visible and consequently more susceptible to immediate critique. One may thus postulate, in accordance to our results, that an individual who is aware of the externalities of nuclear or fossil fuel generating units will be less inclined to 'condemn' wind turbines whose externalities are concentrated where they are sited. Indeed, an interesting feature that comes out of our results is that higher educated respondents are less sensitive to the installation of offshore wind farms at 5 and 8 km from the coast. This leads us to postulate that higher education is a factor, which may facilitate the awareness of the wider discussions associated with conventional electricity generating units, such as climate change or the storage of radioactive waste. This is in line with Bergman et al. (2007) who find that Scottish citizens who are more highly educated are more likely to support renewable energy projects.

Lastly, it should be remarked that our results undeniably indicate that installing wind farms at further distances from the coast can serve to ease opposition to wind power projects. This presents cause for optimism from the point of view of wind farm developers, as most wind farm projects to date are

[14] Since the ASC is dummy coded as equal to one for the status quo, and it is negative and significant, any change away from the status quo (including the installation of wind farms), can be interpreted as welfare enhancing according to its marginal value.

proposed for or installed at a distance at least 10 km from the shore (4coffshore). The depth of the Mediterranean Sea floor however is such that 12 km offshore is the economically feasible frontier in the light of current and foreseeable feed-in tariffs for offshore wind power installations (Lourie and Cabanis 2011).

7.1 Caveats of the study

A substantial body of evidence suggests that WTA responses are several times larger than WTP responses for the same change (Freeman, 1993; Horowitz and McConnell, 2002). Our aim in this study was to demonstrate the influence of socio-demographics and opinion-based discourses on demand or aversion to wind farm siting. We therefore considered correcting for WTP-WTA asymmetry as beyond the scope of this paper. The interested reader is referred to Westerberg et al. 2012b. The core contribution of this paper lies in the conceptual framework presented in figure 1. This calls for a few extensions to the preference-drivers that we have considered in the present study. In particular, we did not include specificities about the *kind* of experience and knowledge that subjects have regarding wind turbines *and* other renewable energy producing facilities. With respect to the latter, Ladenburg (2012) shows that demand for wind power, biomass or solar power development depends on whether an individual has to look out over one or many wind turbines from their property, the distance of the turbines from the property and whether the turbines are located offshore or onshore. Lastly, it may also be stipulated that demand for any one renewable energy source is the outcome of a joint matrix of experience and knowledge based parameters for all existing energy sources, renewable and non-renewable. Further research is needed, along the lines of Ladenburg (2012) to properly account for the effect of experience and knowledge on the marginal rates of substitution between different energy producing technologies.

8 Concluding remarks

Opposition to energy facility siting has generally been explained by the ‘Not in my back yard, but happily on anyone else’s patch’ reaction. But the NIMBY label ‘leaves the cause of opposition unexplained’ (Kempton et al., 2005) and consequently it lacks explanatory value. In this paper, we have attempted to propose an alternative, coherent conceptual framework to replace the NIMBY concept. Our motivation for building this framework is based on arguments such as Tjernström and Tietenberg (2008: p322) who contend that: “most researchers who study attitudes, perceptions and preferences do so because they sense that what people believe matters beyond the individuals’ lives”. Specifically, by applying our framework to a stated preference valuation study we show that perceived impacts on landscape, noisescape and wildlife; perceived effectiveness of wind power compared to alternative energy sources, and the perceived urgency of tackling climate change or replacing nuclear energy can each help explain the degree of aversion that individuals experience to locating offshore wind farms in the near viewshed.

At the actual planning stage of a wind farm, discourses are characterised by identifying necessary trade-offs between perceived landscape impacts, the protection of sensitive areas, installation costs and returns on wind speed (Ellis 2007). However, in many instances the wind farm project is abandoned before the necessary trade-offs have taken place. Typically, the project is abandoned when faced with significant local resistance. Our results suggest that tourist community preferences around wind farms in the near viewshed are likely to be influenced by the information they have on climate change; the real cost of wind power (compared to alternative energy sources); the effectiveness of renewable energies and its capacity to replace conventional fuels. We also show that nationality and education matter, most probably because these two factors are likely to influence how informed citizens are with respect to the former issues. These results are in line with Fimereli et al (2008) who show that knowledge about energy producing facilities can drive up demand for renewable energy sources, such as wind power. Our research findings are of pertinence to current practice - public acceptance has been referred to as the energy sector's biggest headache (Renssen 2011). To confront this policy impasse, our results emphasize the importance of recognising that beyond physical aspects, people's choices are shaped and constrained by their social, cultural and institutional contexts (Owans and Driffil 2008).

References

4coffshore 2012. Global Offshore Wind Farms Database. Retrieved 10/05/2012 from URL: www.4coffshore.com/offshorewind

Abdi, H., 2003. Factor Rotations in Factor Analyses. In: Lewis-Beck M., Bryman, A., Futing T. (Eds.) (2003). Encyclopedia of Social Sciences Research Methods. Thousand Oaks (CA): Sage.

Agasse, A. 2010. Eoliennes en mer: un appel d'offres de 10 milliards d'euros en septembre. 24th of August 2010. Agence France Presse. Retrieved 10/12/2011 from URL. www.google.com/hostednews/afp/article/ALeqM5grNmJeJAKOzxzTnv8TPARx1slJQ.

Alliance to protect Nantucket sound (2011) press release. Response to Cape Cod approved by Obama administration approved in 2010.Retrieved 5/4/2012. www.saveoursound.org/press_releases/reader.php?id=13 .

BBC World, 2009. Nuclear Europe: Country guide. Wednesday, 15 April 2009. Retrieved 10/5/2012. http://news.bbc.co.uk/2/hi/europe/4713398.stm

D. Bell, T. Gray, C. Haggett, C. 2005. The 'social gap' in wind farm siting decisions: explanations and policy responses. Environmental Politics, 14 (4), 460–477.

Ben-Akiva, M., Lerman, S.R., 1985. Discrete choice analysis: theory and application to travel demand. MIT Press, Cambridge, M.A.

Bergmann, A. E., Colombo, S., Hanley, N., 2007. The Social-Environmental Impacts Of Renewable Energy Expansion In Scotland. Presented at The Agricultural Economics Society's 81st Annual Conference, University of Reading, UK 2nd to 4th April 2007

Bishop, I.D., & Miller, D.R. 2007. Visual Assessment of Offshore Wind Turbines: The Influence of Distance, Contrast, Movement and Social Variables. *Renewable Energy, 32*, 814-831.

Bossen, R., 2012. How Germany's powerful renewables advocacy coalition is transforming the German (and European) energy market. *The European Energy Review,* 27 February 2012.

Boxall, P. C., & Adamowicz, W. L. 2002. Understanding heterogeneous préférences in random utility models: a latent class approach. Environmental and Resource Economics, 23(4), 421-446.

Boxall, P., Adamowicz, W. L., & Moon, A. 2009. Complexity in choice experiments: choice of the status quo alternative and implications for welfare measurement. Australian Journal of Agricultural and Resource Economics, 53(47), 503-519.

BRL, 2003. Schema de reference des services de l'etat en Languedoc Roussillon pour l'implantation d'éoliennes en mer. Phase 1: Analyse des impacts prévisibles et recommendations Montpellier: The Region of the Languedoc Roussillon. Retrieved the 10th of Jan 2011 from URL: http://www.languedoc-roussillon.ecologie.gouv.fr/eolien/smnlr/phase%201/rapportPhase1.pdf.

Burstyn, I., 2004. Commentary Principal Component Analysis is a Powerful Instrument in Occupational Hygiene Inquiries Ann. occup. Hyg., Vol. 48, No. 8, pp. 655–661.

Börner, K., Chen, C., Boyack, B., 2003. Visualizing Knowledge Domains. In Blaise Cronin (Ed.), Annual Review of Information Science & Technology, Volume 37, Medford, NJ: Information Today, Inc./American Society for Information Science and Technology, chapter 5, pp. 179-255, 2003.

Cabanis, M., & Lourie, S. 2010. Personal communication. SM2 Solutions Marines. Stratégies des territoires de la Mer, 2 Place Viala - 34060 Montpellier.

CleanTechnica, 2012. France, Economy, Environment Come Out Ahead in Historic First Offshore Wind Tender. April 16th 2012. Retrieved the 20/4/2012. URL: http://cleantechnica.com/2012/04/16/france-economy-environment-come-out-ahead-in-historic-first-offshore-wind-tender/

Conseil municipal Portiragnes 2011. Comte rendu du Conseil Municipal le 29 juillet 2010. Retrieved the 10th of Jan 2011 from URL:http://www.ville-portiragnes.fr/files/Conseil%20municipal%202010/CM-27.07-2010.pdf

Devine-Wright, P., 2005. 'Beyond NIMBYism: towards an integrated framework for understanding public perceptions of wind energy'. *Wind Energy*, 8(2), 125-139.

Devine-Wright., P., Howes, Y., 2010. Disruption to place attachment and the protection of restorative environments: A wind energy case study. Journal of Environmental Psychology 30, 271–280

Dimitropoulos, A. Kontoleon, A., 2009. "Assessing the Determinants of Local Acceptability of Wind-Farm Investments: A Choice Experiment in the Greek Aegean Islands." Energy Policy 37 (5), 1842–54.

Eleftheriadis, N., Tsalikidis, I., Manos, B., 1990. Coastal Landscape Preference Evaluation: Comparison among Tourists in Greece. Environmental Management 14 (4): 475-487

Ellis, G., Barry, J., Robinson, CK., 2007. Many Ways to Say 'No', Different Ways to Say 'Yes': Applying Q-Methodology to Understand Public Acceptance of Wind Farm Proposals. Journal of Environmental Planning and Management, Vol. 50, No. 4, 517 – 551, July 2007

Enerzine, 2011. Eolien 2020: la France ne tiendra pas ses engagements. Published the 12th of Jan 2011. Retrieved from January 10th 2011 URL. http://www. enerzine.com/3/11126eolien-2020–la-france-ne-tiendra-pas-ses-engagements. html.

Everitt, B. S., Dunn, G., 1991. Applied Multivariate Data Analysis, Edward Arnold, London.

Fimereli, E. Mourato, M., Peter, P., 2008. "Measuring Preferences for Low-Carbon Energy Technologies in South-East England: The Case of Electricity Generation." Paper presented at ENVECON 2008: Applied Environmental Economics Conference, London, March 14

Firestone, J., & Kempton, W., 2007. Public opinion about large offshore wind power: underlying factors. Energy Policy, 35, 1584-1598.

Frantal, B., & Kunc, J., 2011. Wind turbines in tourism landscape: Chech Experience. *Annuals of tourism research,* 38(2), 499-519.

Freeman, A. M., 1993. The Measurement of environmental and resource values: Theory and methods. Resources for the future. Washington DC.

Gee, K., & Burkhard, B., 2010. Cultural ecosystem services in the context of offshore wind farming: a case study from the west coast of Schleswig-Holstein. Ecological Complexity 7, 349-358.

Guipponi, P., 2011. Eoliennes - Dans la région, c'est non à l'offshore. The Midi Libre, Monday the 24th of January.

Groothuis, P. A., Groothuis, J. D., & Whitehead, J. C., 2008. Green vs. green: Measuring the compensation required to site electrical generation windmills in a viewshed. Energy Policy, 36, 1545-1550.

Haggett, C., 2011. Understanding public responses to offshore wind power. Energy Policy, Volume 39, Issue 2, 503–510.

Harman H. H., 1976. Modern factor analysis. Chicago: The University of Chicago Press.

Hess, S., Beharry-Borg, N., 2012. Accounting for Latent Attitudes in Willingness-to-Pay Studies: The Case of Coastal Water Quality Improvements in Tobago. Environmental and Resource Economics, in press.

Horowitz, J. K., and McConnell, K. E., 2002. A review of WTA / WTP. Journal of Environmental Economics and Management, 44, 426-447.

Jolliffe, I.T. 2002. Principal Component Analysis Series: Springer Series in Statistics. 2nd ed., 2002, XXIX, p. 487.

Jones, C.R., Eiser, J.R., 2009. Identifying predictors of attitudes towards local onshore wind development with reference to an English case study, Energy Policy, 37 (11), pp. 4604-4616

Jones, C. R., Orr, B.J., Eiser, R., 2011. When is enough, enough? Identifying predictors of capacity estimates for onshore wind-power development in a region of the UK. Energy policy, 39 (8), 4563–4577.

Kahn, R. D., 2000. Siting struggles: the unique challenge of permitting renewable energy power plants. The Electricity Journal 13(2), 21–33.

Kaiser, H. F. 1960. The application of electronic computers to factor analysis. Educational and Psychological Measurement, 20, 141-151.

Karousakis, K., Birol, E., 2008. Investigating household preferences for kerbside recycling services in London: A choice experiment approach. Journal of Environmental Management 88, 1099–1108.

Kempton, W., Firestone, J., Lilley, J., Rouleau, T. and Whitaker, P. (2005) 'The off-shore wind power debate. Views from Cape Cod', Coastal Management, 33, 119–149.

Klem, M., 1992. Sustainable tourism development, Languedoc-Roussillon thirty years on. Tourism Management, 13(2), 169-180.

Kontoleon, A., Yabe, M., 2006. Market segmentation analysis of preferences for GM derived animal foods in the UK. Journal of Agricultural & Food Industrial Organization, 4 (1), article 8.

Krueger, A, D., Parsons, G. P., Firestone J., 2011. Valuing the Visual Disamenity of Offshore Wind Power Projects at Varying Distances from the Shore: An Application on the Delaware Shoreline *Land Economics May 87,268-283*

LaCroix, D., Pioch, S., 2011. The multi-use in wind farm projects: more conflicts or a win-win opportunity? *Aquatic Living* Resources 24, 129–135.

Ladenburg, J., and Dubgaard, A. 2007. Willingness to pay for reduced visual disamenities from offshore wind farms in Denmark. Energy Policy, 35 (8), 4059-4071.

Ladenburg, J., 2010. Attitudes towards offshore wind farms—The role of beach visits on attitude and demographic and attitude relations. Energy Policy, 38, 1297–1304.

Ladenburg, J., 2011: Local attitudes towards wind power, the effect of prior experience. In: Krause, Gesche (eds.): From Turbine to Wind Farms - Technical Requirements and Spin-Off Products. InTech, 4-14.

Ladenburg, J., 2012. Dynamic properties of the demand for renewable energy sources – a wind power experience based approach. AKF working paper.

Ladenburg, J., & Dubgaard, A. 2009. Preferences of coastal zone user groups regarding the siting of offshore wind farms. *Ocean & Coastal Management*, *52*(5), 233-242.

Landry, C. E., Allen, T., Cherry, T., & Whitehead, J. C. 2012. Wind turbines and coastal recreation demand. Resource and Energy Economics, 34(1), 93-111

Lecolle, L., 2008. Etat des lieux du tourisme sur le littoral du Languedoc-Roussillon. Pôle relais lagunes méditerranéennes e Conservatoire des Espaces Naturels du Languedoc-Roussillon. Retrieved from 05/05/2012. http://www.pole-lagunes.org/ftp/Etat_des_lieux_tourisme_LR.pdf.

Lilley, B.M., Firestone, J., and Kempton, W., 2010. The Effect of Wind Power Installations on Coastal Tourism. Energies, 3, 1-22.

Landry, C. E., Allen, T., Cherry, T., Whitehead, J.C., 2012. Wind turbines and coastal recreation demand, Resource and Energy Economics, 34 (1), 93-111.

Lothian, A., 1999. Landscape and the philosophy of aesthetics: is landscape quality inherent in the landscape or in the eye of the beholder? Landscape and Urban Planning 44 (4), 177-198.

Louviere, J., Hensher, D.A., Swait, J., 2000. Stated choice methods: analysis and application. University Press, Cambridge, England.

Molnarova, K. Sklenicka, P, Stiborek, J, Svobodova, K, Salke, M., Brabec, E., 2012. Visual preferences for wind turbines: Location, numbers and respondent characteristics Applied Energy 92, 269–278.

Möller, B., Lixuan Hong, Reinhard Lonsing, Frede Hvelplund, Evaluation of offshore wind resources by scale of development, Energy, Available online 11 February 2012, ISSN 0360-5442, 10.1016/j.energy.2012.01.029.

Nunes, P.A.L.D., Schokkaert, E., 2003. Identifying the warm glow effect in contingent valuation. Journal of Environmental Economics and Management 45 (2), 231–245.

Owans, S., Driffill, L., 2008. How to change attitudes and behaviour in the context of energy. Energy Policy 36, 4412-4418.

Pasqualetti, M., 2001. Wind energy landscapes: society and technology in the California desert. Society and Natural Resources 14 (8), 689-699.

Punt, M.J., Groeneveld, R.A. van Ierland, E.C., Stel. J.H., 2009. Spatial planning of offshore wind farms: A windfall to marine environmental protection? Ecological Economics 69, 93–103.

Rebel, Cowi & Isis, 2011. RESHARE - Benefit-Sharing Mechanisms in Renewable Energy. Final report. Conducted for European Commission DG ENERGY. Retrieved 17th of May 2012 from URL: http://www.reshare.nu/athena/site/file_database/Reshare_outlinenewFINAL.pdf

Renssen, V. S., 2011. Public acceptance: the energy sector's biggest headache. Plus: a practical guide to winning public support for energy projects. The European Energy Review. Report, 16th of June 2011.

Saint Jacob, Y., 2008. France and renewables: A not so passionate love-affair. The European energy review. 22 May 2008. Retrieved 10/5/2012 from URL: www.europeanenergyreview.eu/index.php?id=594

Smith,L. I., 2002. A Tutorial on Principal Components Analysis. Accessed, 20/04/2012 from URL: http://www.sccg.sk/~haladova/principal_components.pdf.

Sovacool, B.K., 2009a Rejecting renewables: The socio-technical impediments to renewable electricity in the United States, Energy Policy, Volume 37, Issue 11, November 2009, Pages 4500-4513.

Sovacool, B.K., 2009b. The cultural barriers to renewable energy and energy efficiency in the United States, Technology in Society, Volume 31, Issue 4, November 2009, Pages 365-373.

Swofford, J., Slattery, M., 2010. Public attitudes of wind energy in Texas: Local communities in close proximity to wind farms and their effect on decision-making. Energy Policy, 38 (2010), 2508-2519.

Söderholm, P., Ek, K., Pettersson, M., 2007. Wind power development in Sweden: global policies and local obstacles. Volume 11, Issue 3, April 2007, Pages 365–400

Tjernström, E., Tietenberg, T., 2008. Do differences in attitudes explain differences in national climate change policies? Ecological Economics, Volume 65, Issue 2, Pages 315-324.

The Economist, 2010. “Not on my beach, please” Wind energy and politics. Aug 19th 2010 Athens, *Hyannis and Sydney*.

Thurstone, L.L., 1931. Multiple Factor Analysis. Psychological Review, 38, 406-427.

Toke, D., 2005. Explaining wind power planning outcomes: Some findings from a study in England and Wales. Energy Policy, 33(12), 1527-1539.

Van der Horst, D., 2007. NIMBY or not? Exploring the relevance of location and the politics of voiced opinions in renewable energy siting controversies, Energy Policy 35(5), 2705-2714.

Warren, C.R., Lumsden, C., O'Dowd, S. and Birnie, R.V., 2005. 'Green on Green': Public Perceptions Wind Power in Scotland and Ireland. *Journal of Environmental Planning and Management*, 48, 853-875.

Westerberg, V., Bredahl-Jacobsen, J., Lifran, R., (In Press). The case for offshore wind farms, artificial reefs and sustainable tourism in the French Mediterranean. *Journal of Tourism Management.*

Westerberg, V., Bredahl-Jacobsen, J., Lifran, R., 2012. WTP-WTA asymmetry: Evidence of loss aversion, increasing price sensitivity and respondent characteristics reducing asymmetries. LAMETA working paper.

Wolsink, M. 2006 Invalid theory impedes our understanding: a critique on the persistence of the language of NIMBY. Transactions of the Institute of British Geographers. NS 31, 85-91.

Wolsink, M. 2007. "Wind power implementation: The nature of public attitudes: Equity and fairness instead of backyard motives'." Renewable and Sustainable Energy Reviews 11(6): 1188-1207.

Wolsink, M., 2010. Near-shore Wind Power – Protected Seascapes, Environmentalists' Attritudes, and the Technocratic Planning Perspective. Land Use Policy (2010), 27(2),195-203.

APPENDIX 1.

	Transformed scale (1-3)	Original scale (1-5 / 1 - 3)
In terms of energy Policy, how do you rate the prospect of the following choices?		
• The continued use and development of nuclear energy • The continued use of fossil fuels and the development of their extraction and combustion techniques • The employment of CO_2 taxes (reversed scale)	(1) Important / very important (2) Little important / not important (3) To be avoided altogether	(1) Very important (2) Important (3) Little important (4) Not important (5) To be avoided
Your opinion about climate change:		
• Do you consider that climate change is a problem, which should be taken seriously? • Do you consider that your country ought to carry out significant reductions in its CO_2 emissions?	(1) No (2) Maybe (3) Yes	-ii-
Do you think that renewable energies used for generating electricity offer a viable substitute for:		
• Nuclear energy • Fossil fuels	(1) No (2) To some extent (3) Yes	-ii-
As wind power penetrates the energy market, what do you think will happen to:		
• Electricity prices? • tax burden on Citizens?	(1) Significant decrease/ decrease (2) No impact (3) Increase/ increase significantly	(1) Significant decrease (2) decrease (3) no impact (4) increase (5) significant increase
What association do you make with wind power in regard to its efficiency?		
	(1) Very efficient/ efficient (2) Neutral (3) Inefficient/ very inefficient	(1) Very efficient (2) efficient (3) neutral (4) inefficient (5) very inefficient
In your opinion, what influence do you think offshore wind turbines could have on:		
• The landscape • Life in the sea • Noise levels	(1) Very positive/positive (2) Neutral (3) Negative/very negative	(1) Very positive (2) Positive (3) Neutral (4) Negative (5) Very negative

Attitudinal variables used in PCA

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