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Planning globally, protesting locally: Patterns in community perceptions towards the installation of wind farms

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ABSTRACT

The evidence is compelling that extended use and production of energy are globally responsible for the serious deterioration of physical environment and climate change. The further penetration of renewable energy sources (RES) emerges as a crucial factor contributing to the mitigation of global warming. Within this framework wind energy is expected to have a leading role for Greece's compliance with the EU environmental targets of 2020. However, the installation of wind parks in specific regions with high wind potential is seriously constrained by the reaction of local communities. Using a survey the present research dissects public acceptance for existing and proposed wind farms in the region of Southern Evia, Greece. Results indicate an overall support for wind energy and confirm the growing inconvenience with NIMBYism, especially in areas with existing wind parks in operation, as a theoretical framework explaining resistance to planned wind energy investments. By contrasting self-reported ex ante- and ex post-perceptions of impacts and benefits we highlight the role of experience in community acceptance of wind energy installations. Our statistical models prescribe the profile of those most probably in favour of existing installations, new installations in other parts of Evia or new installations elsewhere in Greece. Finally, we introduce the 'Not-In-My-Front-Yard' (NIMFY) syndrome suggesting that the impact of visibility on public acceptance is far from being a simple concept as it is linked to both a physical landscape context and socio-economic parameters.

1. Introduction

Deployment of wind energy in European Union increases rapidly, its cumulative capacity in 2009 being 93 GW [1]. Advancing towards a mature technology for electricity production, wind energy today constitutes an economically efficient alternative while contributing to an improved atmospheric environment [2]. In this context, EU targets of 20–20–20 for the further penetration of renewable energy sources (RES) reinforce and strengthen Greece's commitment to invest in renewables, wind farms being placed at the top of relevant investment strategies. In spite though of an increased deployment of wind energy in the last years – 1723 MW in 2012 – the projection for Greece's compliance with the 2020-targets foresees the further installation of approx. 8000 MW [3]. Investment plans for the implementation of additional 7850 MW of wind parks, submitted for approval to the Energy Regulatory Authority, testify the increased entrepreneurial interest. According to a recent IEA survey, the public acceptance of wind power in Greece can be characterized as high [4]. A national survey confirms the above conclusion [5]. On several occasions though, intense resistance by local communities delay and oft postpone the installation of new wind parks.

Various studies focus on the examination of attitudes towards wind energy, highlighting issues related to the puzzling divergence between 'social' and 'individual' gaps in wind energy acceptance [6]. An explanation of this apparent contradiction is often sought in the Not-In-My-Backyard (NIMBY) syndrome where an individual opposes the installation of wind turbines in his own community but favours it elsewhere. In essence, NIMBYism is a specific expression of a 'tragedy' where rational individuals pursuing their self-interest produce a socially irrational outcome in the 'commons' [7]. As such, NIMBYism has been criticized as not being capable to capture the complexity and multiplicity of social attitudes and preferences towards wind farms [8–12].

The vast majority of published studies focus on the analysis of public perceptions in the case of planned wind parks. Only few deal

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with issues of public acceptance in sites with existing wind farms. Now that wind farm installations in Europe have reached a critical mass, focussing on sites with wind farms installed near them allows the researcher to systematically investigate the potential differentiations in public perceptions between the pre-project period and the post-project period and analyse the role that experience plays in shaping the relatively advanced segments of it; a parameter technically impossible to analyse when focussing just on planned wind farms. The present paper contributes to this goal by focussing on the determinants of public acceptance at local and global levels seen through the lens of experience with wind energy installations.

The paper is structured as follows: Section 2 presents the theoretical background of our study. Section 3 describes the methodological framework in terms of the implemented methodology (Section 3.1), location of the survey (Section 3.2) and details about the participants and the procedure of data collection (Section 3.3). The main survey results are analysed in Section 4. Section 5 offers a discussion of the results from the perspective of new insights. Finally, in Section 6 conclusions are drawn.

2. Theoretical background

The theoretical background of the paper is based on NIMBY syndrome and its potential validity in areas with existing wind parks. As it is the case with the concept of 'tragedy of the commons', the critique on NIMBYism is multifaceted; its main arguments are summarized below.

Firstly, and most importantly, NIMBYism seems to imply a clear and immutable *spatial* effect: the closest the wind energy installation to one's 'backyard', the strongest her/his opposition. Empirical evidence on this is not conclusive: Whereas several authors [e.g. 13,14] find proximity to be positively related to resistance, research by the Scottish Executive Public Research Unit [15] leads to the opposite conclusion. Going beyond a simple spatial proximity heuristic, [12, p. 3116] redefined 'backyard' as '*the extent to which development is anticipated to be directly visible*'.

Secondly, NIMBYism seems to be totally disentangled from an appropriate *time* scale. Researchers frame the dynamics of NIMBYism in terms of a U-shaped life-cycle analysis of wind energy acceptance. Public resistance is usually observed during the construction phase, while acceptability increases after a short period [16]. It is tempting to conclude that increased exposure over time is bound to raise public support for wind energy installations [17]. However, as noted by Devine-Wright [9, page 130] this relation is much more complex due to numerous other influences impacting on the evolution of people's beliefs and attitudes.

Thirdly, NIMBYism is clearly linked to the physical characteristics of wind energy projects, visual intrusion being cited as the main factor negatively affecting public acceptance of wind parks [12,18]. Furthermore, resistance to wind energy can be created by other important physical characteristics, e.g. size, noise and impact on local ecosystems [19,20].

Fourthly, NIMBYism is clearly linked to institutional arrangements demarcating planning, licencing, construction and operation of wind energy projects. Foremost, a socially accepted spatial planning procedure is a prerequisite for successful wind energy investments [21]. Bell et al. [6] show that active citizen involvement in the designing phase, coupled with the prospect of a share from the obtained revenues, are essential parameters for the successful implementation of any proposed wind park. Other important reasons for public reactions can be lack of trust for the politicians, the decision-making process and the private companies that install and exploit the wind energy. This conclusion is confirmed by the significant linkages between available information, transparency in the planning and participation of local society in the decision-making procedure [22–24]. Notwithstanding their success in addressing several key questions, published studies on perceptions of wind farms are often criticized as 'fragmented and atheoretical' [[9], page 136]. As expected, the critique on NIMBYism has created a theoretical vacuum that researchers seek to fill with more detailed social research on all factors shaping public acceptance [28,29]. In an attempt to systemize key factors affecting social acceptance of renewable energy sources, Wüsstenhagen et al. [30] suggested a threefold categorization: socio-political, community and market acceptance. In a similar line, Devine-Wright [9] proposed eight categories: natural, political, institutional, socio-economic, ideological, symbolic, local and personal. In this direction, Devine-Wright [9] investigates public beliefs about local renewable energy development in UK and stresses the importance of channelling part of the benefits of wind parks to local communities.

Though often in the Greek mass media, local resistance to wind energy installations has been approached only sparsely. Kaldellis [25] is a first attempt to analyse public acceptability of existing and proposed wind parks in Greece. The authors surveyed a random sample from three communities with and without experience with wind energy installations. Results suggested a positive attitude in areas with existing installations but a less positive one in areas where new installations are proposed. Factors affecting public attitudes and institutional, governance and trust issues were not examined. Dimitropoulos and Kontoleon [26] looked at factors boosting public resistance towards new wind parks in two Aegean islands and estimated citizens' willingness-to-accept compensation (WTA) for the proposed projects applying a choice modelling approach. The results suggested that the conservation status of the area along with perceived fairness of the planning procedure are the two most important determinants of local acceptance; physical attributes of the proposed projects appear to be less important. Finally, Oikonomou et al. [27] surveyed the policy barriers to renewable investments in the Dodecanese islands and commented shortly on factors affecting public attitudes without going into details.

3. Methodological framework

Our motivation in the present paper is to analyse public perceptions with the identification of a robust statistical attitude model of community acceptance towards existing wind energy installations. Details regarding the proposed methodology and the design of the survey are presented in the following sections.

3.1. Implemented methodological approach

We apply an ordered probit model from the class of probabilistic multivariate techniques [31] to investigate the characteristic profiles of people opposing and supporting wind energy at community level according to their responses as collected through a survey. The ordered probit model involves a qualitative dependent variable for which the categories have a natural order or ranking that reflects the magnitude of some underlying continuous variable. Our data map accordingly an underlying, naturally ordered preference scale (the 'random utility function') to a discrete, ordered observed outcome, i.e. a rating scheme. Our model includes standard attitudinal, socio-demographic and physical variables. Of special importance are variables characterizing experience with wind energy installations.

Probabilistic multivariate techniques are based on a probabilistic version of utility maximization, the *Random Utility Modelling* (RUM). RUM allows for maximization of latent preferences by decomposing utility functions into two additively separable parts: a deterministic and a stochastic component. While the deterministic component is specified as a function of measured attributes of the