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Analysis

The Role of Community Involvement Mechanisms in Reducing Resistance to Energy Infrastructure Development

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ABSTRACT

Across the EU, significant investments are being made in renewable generation and grid technologies, however, policy makers and planners are frequently met with resistance from local communities to proposed infrastructure development. Offering some form of involvement to the affected communities may reduce objections and minimise project delays. We carry out a nationally-representative survey of Irish citizens to analyse how different involvement methods affect acceptance. Ireland is a useful case study because of its high RES-E targets. Survey respondents are presented with four involvement models for the local construction of a wind farm, and two for the local development of the transmission grid. We find a preference for schemes in which people receive financial compensation without sharing in the ownership and associated risks of project development. Our econometric analyses show that socio-demographic characteristics such as age and income are significant predictors of people's acceptance under different schemes. Moreover, we find that the satisfaction with local planning procedures and the trade-off people make between environmental sustainability and economic competitiveness are consistently associated with people's attitudes. Such evidence can help policy makers better understand and design policies to minimise resistance to energy infrastructure development.

1. Introduction

In order to meet greenhouse gas reduction and renewable expansion targets, significant investments in electricity generation from renewable sources (RES-E) and grid technologies are necessary across the EU. However, while citizens generally express acceptance of these investments on an abstract or theoretical level (Wüstenhagen et al., 2007; Van der Horst, 2007), policy makers and planners are frequently met with resistance from local communities to specific energy infrastructure development proposals.[1] A potential way of reducing the gap between acceptance of infrastructure on an abstract level and acceptance in the face of actual development, is to offer some form of compensation to the affected communities.

There are numerous methods of compensating and involving local communities in infrastructure development, however, evidence on which methods are most effective at increasing acceptance is scant. Furthermore, most existing research focuses on showing that community involvement or compensation schemes can reduce local opposition rather than exploring what drives the acceptance of energy infrastructure development or increases acceptance under different schemes, which is the primary contribution of our paper. Through our analysis, we aim to shed light on the following issues: How do citizens feel about proposed expansion of renewable electricity infrastructure in their locality? Relative to a situation in which the community is not involved or compensated for infrastructure development, do their opinions change when different community involvement schemes are proposed? Which socio-demographic characteristics and attitudinal factors are significantly correlated with acceptance levels, or increased acceptance, under a range of hypothetical community involvement schemes? As there is no available data, based on either revealed or stated preferences, that allow us to quantitatively answers these questions, we conduct a nationally-representative survey to analyse people's acceptance of energy infrastructure development under different involvement schemes based on stated preferences.

Ireland provides a useful case study in this regard because of its high RES-E targets, and because of the significant energy infrastructure expansion that reaching these targets will necessitate. However, despite its targets and the high RES-E potential available, research on the acceptance of energy-related infrastructure in Ireland is rare to date. The dominating RES-E technology in Ireland is onshore wind, the further development of which requires an accompanying expansion of the

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[1] See, for example, Bell et al. (2005), Zoellner et al. (2008), Raven et al. (2009), Devine-Wright (2011), Musall and Kuik (2011), Guo et al. (2015), and Rand and Hoen (2017).

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transmission grid. Given the interdependency of these two technologies, we present respondents with involvement models for both the local construction of a wind farm, and the local development of the transmission grid. We analyse the responses to our survey using different econometric models, namely an ordered-logit and a logit model, and distinguish between external and internal factors driving the respondents' acceptance of hypothetical infrastructure development, and increases in acceptance levels, under different involvement schemes.

The challenges related to local acceptance and opposition of energy infrastructure development have been discussed by Wolsink (2000), Burningham (2000), Devine-Wright (2005) and Wüstenhagen et al. (2007), amongst others. Existing research on local acceptance and opposition has highlighted the importance of trust (Aitken, 2010), regulations (Battaglini et al., 2012) and perceived (in)justice in terms of how the costs and benefits of projects are shared (Huijts et al., 2012; Ciupuliga and Cuppen, 2013). There is also a large and growing literature emphasising the role of transparent communication, community consultation and information sharing in minimising opposition to infrastructure development (Zarnikau, 2003; Beddoe and Chamberlin, 2003; Gross, 2007; Hobman et al., 2012; National Economic and Social Council, 2014; Rand and Hoen, 2017). Notably, it has been found that offering some form of compensation or involvement to the affected communities, e.g., through full or shared ownership, may reduce objections and minimise project delays (Ek and Persson, 2014; Brennan and Van Rensburg, 2016; Brennan et al., 2017). While Goedkoop and Devine-Wright (2016) emphasise that shared ownership should not be regarded as a silver bullet, they do acknowledge that it may be very helpful if trust between the actors can be ensured.

There have, to date, been a few analyses specific to the Irish context. For example, SEI (2003) analysed the Irish public's attitude towards the development of wind farms at a time where the nation-wide installed wind power capacity was around 200 MW (which increased to over 2800 MW by 2016); however, the analysis of community involvement schemes was not very detailed. Later, the National Economic and Social Council (2014) reviewed national legislation and international literature in relation to wind power development and outlined different community involvement schemes, though not providing a quantitative analysis. Moreover, Van Rensburg et al. (2015) investigate the probability of wind farm planning approval, while Brennan and Van Rensburg (2016) conduct a discrete choice experiment to explore the trade-offs people make to allow for wind power developments in their localities. What these studies have in common is that they focus on wind power without considering the necessary accompanying expansion of the transmission grid.

Despite the fact that a number of papers have considered energy infrastructure expansion, and local opposition to it, there has not, to date, been a comprehensive analysis of the drivers of acceptance of both wind and transmission infrastructure under a range of involvement schemes. Such evidence is needed to help policy makers better understand and design policies to minimise perceived injustices of infrastructure development; addressing this knowledge gap is the fundamental contribution of our analysis.

This paper is structured as follows. In Section 2 we discuss the survey design, and how it was informed by previous analyses from the literature. In Section 3, we describe the data collection process and present the econometric techniques used for our analysis. In Section 4 we outline the survey findings and the results of our econometric analysis; a more detailed discussion of these results is presented in Section 5. In Section 6, we summarise the main findings and derive conclusions. Further details of the questionnaire are presented in Appendix A, while Appendix B provides additional results.

2. Designing the Questionnaire

2.1. Background

There is a large and growing literature on institutional aspects and ownership structures of renewable energy or grid development projects, which analyse community involvement at very different levels.[2] We utilised this body of knowledge to inform the design of our questionnaire. One particularly relevant analysis is the work of Brennan and Van Rensburg (2016). Focussing on wind farm development in Ireland using a discrete choice experiment, the authors find that local acceptance of a hypothetical wind farm development is positively influenced by financial discounts that local residents receive on their electricity bills. The involvement analysed by Brennan and Van Rensburg (2016) did not represent a great depth of engagement, however, as only financial compensation was offered to the participants in their choice experiment. The authors also analysed the impact of (early) community consultation and the presence of a community representative who regularly meets and negotiates with the developers; the authors find that expected levels of compensation are reduced when such a person is present.

Analysing the impact of a deeper level of involvement, Warren and McFadyen (2010) compare public attitudes towards existing community-owned versus developer-owned wind farms in two Scottish communities and find that attitudes towards wind power are more positive in the community that owns the wind farm. What the studies by Brennan and Van Rensburg (2016) and Warren and McFadyen (2010) have in common is that they study the impact of a single community involvement scheme (a rather shallow involvement in the former and a deeper involvement in the latter case), not allowing for comparisons between different schemes.

Ek and Persson (2014) analyse and compare different wind farm ownership models in Sweden using a discrete choice experiment. The authors include hypothetical projects owned by the state or by private developers (not offering involvement or compensation to residents), as well as municipality-owned and shared ownership projects (i.e., shared ownership between private developers and the municipality/residents). They find that respondents prefer wind farms fully or partially owned by the municipality; indicating a preference for deeper levels of involvement.

While there have been a number of studies exploring different nuances of compensation and involvement schemes for wind farms, which we can use to guide our analysis, research on involvement schemes for transmission grid developments is rather rare. The few exceptions are Cohen et al. (2016) and Devine-Wright and Batel (2013) who, amongst other things, explore the impact of compensation schemes to communities or residents that are affected by hypothetical grid developments across the EU and in the UK respectively. However, deeper levels of involvement are typically not considered in the case of grid development, as the responsibility to operate and maintain the grid and ensure supply reliability cannot be given to individual communities.

Based on the different community involvement and compensation schemes studied in the literature, our survey included three distinct categories of variables: *Category 1* comprises the dependent variables, while *Categories 2 & 3* are aimed at eliciting the explanatory (independent) variables. Further details of the survey are provided in Appendix A.

2.2. Outcome Variables

2.2.1. Survey Question Category 1 (Dependent Variables)

We asked respondents how willing they would be to accept the development of energy infrastructure (focussing on wind farms and transmission lines) in their local community in the presence of either no community involvement or one of a set of hypothetical schemes (described in detail to the respondents), which varied by their depth of community involvement. They were asked to express their willingness

[2] See, for example, Toke (2005), Gross (2007), Jobert et al. (2007), Walker and Devine-Wright (2008), Bauwens et al. (2016), Schreuer (2016), Goedkoop and Devine-Wright (2016), Walker and Baxter (2017), and Devine-Wright et al. (2017).