

EMPIRICAL ANALYSIS OF LOCAL OPPOSITION TO NEW ENERGY INFRASTRUCTURE

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Overview

The current European Union vision for a low carbon electricity grid requires a large-scale expansion of overhead transmission lines to integrate renewable energy sources and ensure a secure electricity supply for the future. Recently, new installations of overhead transmission lines across Europe have been stymied by local opposition, which causes long delays in project completion and occasional cancellations. This study presents and analyzes data from an unprecedented survey on the social acceptance of transmission lines that was conducted in all EU-27 member states. We find that auxiliary information regarding the positive effects of a grid development project can have a substantial impact in decreasing the opposition of local stakeholders. In particular, emphasizing any long-term carbon reduction potential or economic benefit of a particular project will, on average, decrease the likelihood that a local resident is strongly opposed to the project by 10–11%.

Additional to the acceptance of physical energy infrastructure, broad acceptance of intelligent components of the so called Smart Grids is equally important. Research therefore addresses the issue for Smart Grids, and in particular for their protection from Cyber Threats as well, while results will be available only shortly before the conference itself.

Methods

Data on the social acceptance of grid expansion projects come from an unprecedented survey conducted during 2012 in all EU-27 nations.⁴ This massive survey effort encompassing over 13,000 interview hours and over 400,000 contact attempts yielded over 8,000 completed questionnaires with around 300 survey responses per nation. The survey obtained demographic, energy usage, and energy perception information from each individual. The survey process included strict quotas to ensure a representative sample among the population of each EU-27 nation.

The final survey data set included 8,336 complete observations. The data then underwent a cleaning process and some recoding to create econometrically useful variables, leaving 7,659 observations used in the final analysis. As previous research has shown that residents' perceptions influence their level of opposition we hypothesize that positive information regarding nearby infrastructure projects will move locals closer to acceptance (e.g. Gross, 2007; Devine-Wright, 2011; Kaldellis, 2005). To test this hypothesis the survey included a built-in experiment in the form of a question regarding the acceptance of a hypothetical grid expansion project. A single project scenario, describing a hypothetical new transmission line, was presented to all respondents, with 40% of respondents receiving only the baseline scenario. Some respondents additionally received one of the three treatment scenarios, each describing a benefit of the infrastructure project: economic benefit, environmental benefit, and monetary benefit on the community level.

The four-tiered response structure of the acceptance question lends itself to econometric modeling using an ordered probit approach. The ordered probit is a standard modeling approach for ordinal data that leads to intuitive and easily interpretable results.

Results

We see from the results that both household characteristics and the tested treatment scripts can drive the level of opposition encountered in our hypothetical scenario. To begin with household-level variables, the results validate previous research and give evidence for possible strategies that can reduce the number of locals who will *definitely not accept without opposition* DNA. From the demographic variables we estimate that older residents, those with higher income, and those with a college degree will be less accepting, while males will, on average, be more accepting. The directional effect on acceptance of these estimates is in line with past studies, most notably Devine-Wright (2012) who uses a similar survey regarding acceptance of power lines in England. As noted in that study, trust in the developing entity, encapsulated in the variable *posutil*, can positively influence acceptance (Devine-Wright, 2012). The results here corroborate that finding, by estimating a 2.3% decrease in the probability of

choosing DNA if the respondent holds a positive view of the local utility company. With the use of a small survey, developers could ascertain which local entities involved in the project are most trusted by local groups and include these entities in the presentation of the project. The two included siting variables, *urban* and *yearsinhome*, suggest that sites chosen nearer to short-term residents and in urban areas will be met with less resistance. The strongest positive effect on acceptance is exhibited by the *needgrids* variable. The estimate indicates that belief in the necessity of grid expansion will decrease the probability of a DNA response by 8.9%. Since, currently, only 56% of survey respondents believe that new pylons and power lines are necessary for a secure energy future, information campaigns aimed at increasing this perception among the population could have substantial positive effects on national and EU-wide acceptance of transmission lines.

The average (across nations) decrease in the probability of a DNA response for the economic, environmental and community treatments are 10.1%, 11%, and 3.6% respectively. All three improvements are significant at the 5% level, showing that any of the three benefits will, on average, improve acceptance and lead to fewer DNA responses. The relatively small marginal effect from the community compensation script is consistent with the previous finding that locals show ambivalence towards such benefit packages in the case of wind farm development (Cass et al., 2010; Cowell et al., 2011). Overall, the results of our study show that information on the positive benefits of a proposed project has the potential to substantially improve acceptance.

Conclusions

In total, our results support the hypothesis that project-related information on ancillary benefits can improve acceptance, and thus we corroborate past research suggesting that perceptions of project outcomes are crucial in influencing social acceptance of new developments. This implies an important role for information campaigns in improving social acceptance of new transmission line projects and paving the way for the low-carbon society envisioned by the European Commission.

References

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