

# The relevance of proximity and workplace experiences for the individual support of power plants: An empirical analysis of wind, coal, and nuclear energy

Groh, D. Elke, Research Associate, Empirical Economic Research, University of Kassel, +49 561 804 3044, elke.groh@uni-kassel.de  
Luigs, Theresa, Student Associate, Empirical Economic Research, University of Kassel, +49 1577 2907904, uk050250@student.uni-kassel.de

Ziegler, Andreas Prof. Dr, Head of Chair, Empirical Economic Research, University of Kassel, +49 561 804 3038, andreas.ziegler@uni-kassel.de

## Overview

This paper investigates how experience with wind, coal, and nuclear power plants influences support for power plant expansion in Germany. Climate change is one of the biggest challenges, humankind must face in the 21<sup>st</sup> century. To prevent global warming, the energy sector plays a crucial role as approximately 35% of greenhouse gas emissions arise in the energy sector. Therefore, the German energy transition is meant to promote changes towards more sustainable and renewable energy. This change includes an accelerated expansion of renewable energies as well as the phase-out of emission-intensive energy sources. The most important and discussed steps to take in this regard are probably the expansion of wind power and the phase-out of coal and nuclear power. Governmental attempts to expand renewable energies usually reveal high support levels within the German population (Zoellner et al. 2018). However, protest against climate protection measures seem to arise as soon as they could affect peoples' personal lives. The well-studied "Not-in-my-backyard-effect" describes the tendency of people to support the expansion of wind power plants in general while opposing it in their close neighborhood (Devine-Wright 2005). Power plants in close proximity to peoples' residences are often associated with negative externalities such as noise, and air pollution (Rand and Hoen 2017) and are, therefore, usually unwanted in people's neighborhoods. While oppositional arguments against new power plants in peoples' neighborhoods are well studied, attitudes of people already experiencing power plants remain largely unknown. After experiencing proximate energy power plants, support levels for the expansion of these power plants could well have changed. Therefore, we analyze how experience with wind, coal, and nuclear power plants shapes support levels for the expansion of these power plants in proximity to peoples' residences. Experience is considered based on two criteria: First, residential proximity, i.e. living close to wind, coal, or nuclear power plants, and second, working experience in the corresponding energy sector.

Other contributions often focus on specific energy sources (e.g. Swofford & Slattery 2010 on wind power) or specific power plants (e.g. Schumacher et al. 2019, Thomson & Kempton 2018). Additionally, working in the energy sector is rarely looked at together with residential proximity although people living close to a power plant, could well work or have worked there (an exception is Sherren et al. 2019). While residential proximity is associated with potential negative externalities, the workplace could be a relevant economic incentive to control for when talking about support for the expansion of power plants. By taking both measures, i.e. proximity and workplace, into account this paper gives a detailed view of experience effects of wind, coal, and nuclear power plants. Additionally, all operating wind, coal, and nuclear power plants in Germany are included in the analysis. The paper, therefore, contributes to the existing literature by directly comparing the experience effects of three energy sources that are crucial for the energy transition. Besides, we include all relevant variables that have been found to affect support for power plant expansion in the past as control variables. Thus, policy implications about how to deal with local opposition to energy plant expansion can be derived.

## Methods

Data was collected through a representative questionnaire among 3705 German citizens. Participants stated their preferences regarding the expansion of wind, coal, and nuclear power plants in their immediate neighborhood. Additionally, participants were asked whether they or someone around them works or did work in the corresponding energy sector (including suppliers). The question about the working experience in the energy sector serves as the first explanatory variable. Furthermore, several questions regarding individual norms and values, economic preferences as well as socio-economic variables were included in the questionnaire to use them as control variables.

Additional data from the Bundesnetzagentur about all operating wind, coal, and nuclear power plants in Germany were used to include as many power plants as possible in the analysis. The power plants were matched to the participants from the questionnaire using ZIP codes. Thus, power plants located within the same ZIP code as participants' residences were identified. To include a wider distance into the analysis, power plants located within 50km of the frontier of the participant's ZIP code were additionally identified. The proximate power plants sorted by the respective energy source serve as the second explanatory variable. The data were used to conduct an econometric

analysis. Binary probit models were used to estimate the influence of residential proximity, and workplace experience on support for the expansion of wind, coal, and nuclear power plants within participant's vicinity.

## Results

Descriptive statistics reveal high support levels for the expansion of wind power plants in vicinity of peoples' residences. These support levels are, as expected, lower for the expansion of coal and nuclear power plants. Furthermore, people preferred the expansion of coal power plants in their neighborhood over nuclear power plants.

Econometric analysis reveals multifaceted results. While proximity to nuclear power plants did not significantly affect the support for the expansion of nuclear power plants in people's neighborhoods, proximity to wind, and coal power plants significantly positively affects the support for the expansion of these power plants. However, the positive significant effect of proximity to coal power plants disappears as soon as a regional control variable accounting for the federal state the participant lives in, is included in the analysis. Results on the experience through the workplace draw a clear picture. Having worked or working in the wind, coal or nuclear energy sector (or knowing someone who did) has a highly significant positive effect on the support for the expansion of the regarding energy source. These results are robust against different model specifications.

## Conclusions

This paper gives a detailed insight into the determinants of support for the expansion of power plants in proximity to peoples' residences. Several policy implications can be drawn from the analysis. First, residential proximity to wind power plants seems to play an important role in shaping support levels for wind power plant expansion. People living in proximity to wind power plants are more supportive of having another power plant in their neighborhood compared to people who have not experienced living close to those power plants. For coal, and nuclear power plants no significant effect was found. We can conclude that peoples' concerns and associated protests against new power plants do not remain after a few years of operation. Second, having working experience in the energy sector of the corresponding power plants highly influences support for their expansion. Therefore, structural change in coal-, and nuclear energy-intensive areas seems to be important in order to convince local municipalities of the energy transition and to secure the economic basis of these municipalities. Lastly, it seems important to continue working on the acceptance of wind power plants to promote energy transition. The support of local host communities is crucial for feasible political decision-making. Hence, it might be advisable to compensate affected municipalities for potential negative externalities through e.g. participation in revenues. More research investigating the effect of experience with power plants on support levels could help to understand these effects in even more depth.

## References

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