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# A qualitative analysis to understand the acceptance of wind energy in Bavaria

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ABSTRACT

Acceptance plays an important role in the successful adoption of wind energy technology. This article identifies factors influencing the acceptance of wind energy and selects those factors which have the highest relevance for wind energy acceptance in Bavaria. We decided to analyze the Federal State of Bavaria in Germany as its current policy governance decelerates the building-up of wind turbines in this federal state. Using a qualitative approach, the results indicate that the perception of political processes, such as the recent enacting of the 10-H regulation in Bavaria, influences the acceptance towards wind energy, as trust and transparency in political processes are essential. In addition, the paper reveals the importance of the distributive justice, focusing in particular on the subitem envy, which can be considered on a neighboring or regional level. Additionally it reveals additional factors which are relevant for wind energy acceptance in the specific case of the analyzed federal state.



**Contents**



## 1. Introduction

The nuclear catastrophe in Fukushima in the high-tech country Japan in March 2011 drastically changed the attitude towards nuclear power in Germany [1]. As a consequence three months later the Federal Government of Germany decided to make a substantial change in the energy policy, including the nuclear phase-out by 2022 [2].

Bavaria has the largest share of nuclear power plants that generate electricity in Germany. Therefore, Bavaria is especially affected by the nuclear phase-out. This means that 46% of the baseload power stations in Bavaria have to be replaced [3]. At the same time, Bavaria is also a highly industrialized region [4] and

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one of the most dynamic economic regions in Europe [5]. Thus, Bavaria has to fill two gaps: the substitution of nuclear power and the maintenance of the energy security for the industry and private households.

Bavaria needs about 4000 modern wind turbines to cover one third of its electricity consumption from wind power. Currently, however, only 937 turbines are installed, which cover 3% of the consumption [6]. Therefore, in May 2011 Bavaria adopted the Bavarian Energy Concept with the general aim to strengthen renewable energies in this Federal State [7].In the field of wind energy, an increase of 6–10% of the power consumption was planned until 2025, which equals to approximately 1000–1500 new wind turbines in this Federal State [8–10]. Contrasting the earlier objectives, the Bavarian state government enacted the 10H regulation in November 2014 [5,11,12]. This law states that the minimum distance between wind turbines and residential areas must be at least ten times the height of the proposed wind turbine. Exceptions are possible through local consensus based on decisions taken by the affected communities. This regulation is regarded to significantly reduce the increase of wind energy in Bavaria in the coming years. After modification in the Bavarian Energy concept in 2015, the Bavarian government only aims an increase of 5–6% in the field of wind energy [13].

Due to these regulations the building up of wind energy turbines has been decelerated in Bavaria. With an average minimum distance of 2000 m (considering the 10H regulation) the space available for wind turbines accounts to 0.05% of the total area of Bavaria [6]. Taking into account that this available area is not always sufficient wind-intensive the remaining area accounts to 0.01% of the Bavarian territory. This distance-related restriction reduced the expansion of wind turbines strongly in the Federal State: in 2014 still 336 applications for wind turbines were submitted, whereat in 2015 this figure dropped to only 25 applications [6].

The 10H regulation and the modification to the energy concept in Bavaria has been enacted although a number of surveys and studies shows a general high acceptance level for wind energy in the population [14]. Although it might be seen as a contradiction, wind energy projects can be rejected locally by the public [15]. Several studies show that while there is a high acceptance level for wind energy, there is strong opposition against local wind energy projects [16–20]. In the last years Germany was confronted with demonstrations against wind energy on a local level. A share of 39% of the population refuse to have wind turbines in their residential environment [21].

A number of studies have researched on specific factors influencing the acceptance towards renewable energy systems [22–24], but a comprehensive overview about factors influencing the acceptance of wind energy remains under-explored. Therefore, this study aims to identify which factors have an influence on the acceptance of wind energy in the specific case of Bavaria. Bavaria represents an interesting area of research since it is a case in which public opposition against local wind energy projects has resulted in fast and significant policy changes which most probably will strongly decelerate the building-up of wind turbines in the coming years.

The development of wind energy is crucial for the energy transition. However, the potential savings of carbon dioxide emissions by the installation of wind power can only be achieved if a variety of stakeholders are in favor of the local development of wind energy. By revealing all relevant factors, the implementation of wind farms could be conducted more successfully. The main questions that this article aims to address are the following: (1) What are the factors influencing the acceptance of renewable energy systems in general? (2) What are the main factors influencing the acceptance of wind energy in the specific case of Bavaria.

The remainder of this paper is organized as follows. Section 2 presents the methodology, including a literature review and expert interviews. In Section 3, current theoretical literature on the acceptance of wind energy is reviewed. The main findings of the literature review and the expert interviews carried out are presented in Section 4. Those results are analyzed, discussed and concluded in Section 5.

## 2. Material and methods

Studying the research questions from more than one perspective enables diverse and detailed explanations and is a powerful possibility of ensuring concurrent validity. Throughout the study data was collected via literature review and expert interviews, ensuring a triangulation of data collection [25,26].

### 2.1. Study selection

We selected peer-reviewed studies that deal with the acceptance of wind energy via searches in Web of Science™ and ScienceDirect® since these databases include social science studies in addition to engineering literature. To supplement our findings, we identified complementing studies published by the Bavarian government, to provide in-depth insight into the Bavarian wind energy policy. The four synonyms wind energy, wind power, wind turbines and wind farms were combined in our database queries with each of the following keywords: acceptance, attitudes, public opinion, preferences, public perception.

The process of the study selection is presented in Fig. 1. Of the total amount of matches in Web of Science™ (n=4523),

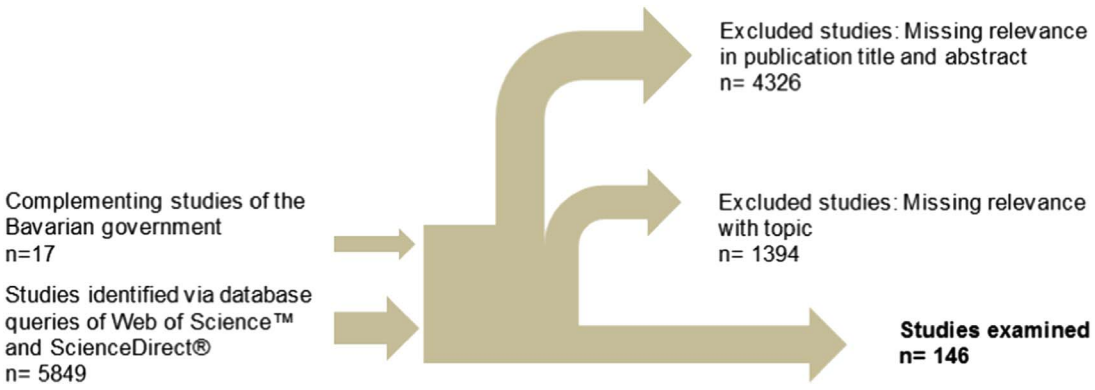


**Fig. 1.** Development of the literature database.