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Explaining regional acceptance of the German energy transition by including trust in stakeholders and perception of fairness as socio-institutional factors

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ABSTRACT

In this paper we pursue the hypothesis that acceptance of the energy transition is not merely determined by technology acceptance but also by the perception of socio-institutional stakeholders and the perception of fairness. We test an acceptance model which includes the following main predictors: attitudes towards the risks of the energy transition and attitudes towards the technology options such as wind power, photovoltaic systems or transmission lines. Additional influences are assumed to arise from the perception of regional added values and the trust in various socio-institutional stakeholders. Furthermore, we expect fairness to be a mediating variable for acceptance. In this paper we test the model empirically with a representative German sample (N = 2009) in a structural equation model (SEM) for the acceptance of onshore wind power. Moreover, we analyse whether differences in the factors are related to the German regions North, East, West and South since we assume regional landscapes, renewable energy sources and socio-political contexts to be important for acceptance. Results show evidence that perception of stakeholders and fairness is important for the regional acceptance. In addition, results show that, among the four regions, different factors are relevant for acceptance. Results are discussed and conclusions for governance are drawn.

1. Introduction

There is consensus among the international community that it is necessary to lower the emission of carbon dioxide (CO_2). Elsewise natural disasters as the consequence of climate change could happen. Therefore, CO_2 reduction goals have been set by international politics. As part of this intervention, the transformation of energy supply systems in European member states is one of the major strategies for climate protection. The goal of the transformation is a shift from conventional fossil fuelled and nuclear power generation to a renewable energy supply system. The German Government has adopted the challenging goals of achieving 80% of electricity generation from renewable sources in 2050. Still, the transformation of energy system presents a political, economic and societal challenge in order to fulfil the time-bound commitments for international climate protection.

The transformation is facilitated by the combined use of several technology options like wind power, photovoltaic and grid technologies. An issue to be dealt with is the costs and flows of revenues for various stakeholders as it is largely financed by private investments. In the same vein, the Federal feed-in law (EEG) which boosted the initial German energy system transformation puts a burden up to1,5 trillion € [1] on the shoulders of German energy consumers – currently with a significant exception for industrial customers.

Although the general attitude among Germans is still positive towards the "Energiewende" (energy transition agreed in 2011 after the nuclear disaster in the Japanese power station in Fukushima) [2], implementation projects for wind turbines and transmission lines have often faced objections from concerned population in the project areas. Populism, post-truth politics, and local resistance [3,4] as well as the role of beliefs in opinions and group identities [5] are affected in this transformation and might be a thread to reach sustainable energy supply structures. In 2013, researchers from social and political sciences, psychology and engineering collaborated with professionals from utilities, energy service providers, as well as governmental bodies, communication and consumer association to elaborate strategies for an increased societal acceptance of the energy system transformation and to overcome potential regional objections.[1]

For a mutual and transdisciplinary understanding the group started

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to develop a heuristic model of regional acceptance in the frame of energy system transformations. Quickly, the discourse revealed that factors influencing acceptance have to be seen in a contextual embedding for both individual perception and socio-institutional structures. Therefore, the group put together a descriptive model which includes contextualisation as much as possible but at the same time still being generalizable. The main result of the group work was the emphasis on perceptions which were regarded as stronger predictors for acceptance than so called objective factors like features of the technology (e.g. height of wind turbines or transmission lines, profit margins for public investment shares or proximity between homes and implementation sites). A second important result was a strong consent in the project group on trust and perceived fairness to play a crucial role in the final shape of acceptance or denial (for details cf. [6]).

In a second step, the descriptive[2] model was related to findings from literature and previous studies to transfer it into a measurable and testable model. Finally, the adapted model was tested with data from a national acceptance survey [7].

In the present paper we briefly present the main elements of the model with existing literature and findings and precise our research questions (chapter 2). Consequently, we then report the empirical testing (chapter 3 and 4) and present and discuss results for the adapted acceptance model with a regional comparison (chapter 5), and draw conclusion for future research and policy (6).

2. Theoretical roots of the empirical model for regional acceptance

In this section we introduce the main components of our model and briefly describe their theoretical origin. Our model consists of seven factors, with acceptance as the main outcome variable, influenced by socio-institutional factors, trust, fairness and attitudes.

2.1. Multidimensional concept of acceptance

Our main aim in this work is to identify those influences which shape individual acceptance or denial. Several terms are frequently used in technology acceptance research, such as acceptability, acceptance, support, adoption and attitudes (see [8]). In this paper, we define acceptance as attitude (an evaluative judgement [9];) towards new technologies and behaviour towards energy technologies. In line with the framework of acceptance proposed by Zöllner et al. [10] we conceptualize acceptance along two dimensions. The evaluative dimension is representing the valuation of acceptance which ranges from positive to negative. The second dimension relates to behavioural activity and can vary between passive and active. While passive stands for showing no apparent behavior to express the valuation of acceptance, the active variant is representing expressive behaviour (attending demonstrations, signing protest letters) and practical behaviour (investing in renewable energy technologies, engaging in action groups, lending land for wind turbines). In a two dimensional matrix, acceptance can therefore be classified as rejection or consent (passive) and involvement or resistance (active). Acceptance in its passive form can be regarded as an attitude [10,11]. Hofinger [12] suggests including the emotional relation towards the object of acceptance [13] as a third dimension. According to Hofinger [12], the emotional components manifest very strongly in the active categories of acceptance whereas emotions play only moderate or minor roles in the passive categories. Her approach highlights the emotional states of indecisiveness expressed as indifference with little emotional significance versus an inner conflict towards an issue with changing, rather strong, emotional states.

Therefore, we operationalized the measurement of acceptance with five categories by including the four categories from Zöllner et al. [10] and added one category for indecisiveness. Following Wüstenhagen et al. [14] we located the concept of acceptance to local acceptance. This emphasis on local acceptance instead of socio-political acceptance of renewable technology options is reflecting the finding that socio-political acceptance of renewable technology options [2] is often not correlated with local acceptance (often misleadingly claimed as NIMBY effects, [15–17]).

2.2. Socio-institutional factors of energy system transformation and their perception

Spatial aspects are often considered to play an important role in the acceptance of the energy transformation. The implementation of industrial-like infrastructures, such as wind turbines and transmission lines, impacts the perception of a landscape or – in the phase of planning – is often anticipated with severe intrusion of existing landscape [18]. Several studies have extensively shown that this is not only due to the heights of wind turbines or the distances between energy infrastructures and residential areas but the perception of rather socio-institutional factors [19,20]. Such factors include the national political environment, the local perception of economic impacts, social influences such as trust and institutional factors such as fairness and transparency of the planning and execution of the project [21–23].

The dependencies between technical, ecological, economic and institutional conditions and their integration in socially constructed, shared identities and individual perceptions are considered as social framings of places [24,25]. Such framing constructs individual and community place-meanings and –attachments which integrate physical and social place attachment, genealogical (historical) place attachment, and the place quality in categories of being contested, general climate in place and innovativeness of place [26]. Social perceptions, like social framing or the evolution of social representations and shared meanings [27], are typical social cognitive processes which help individuals to identify and structure social settings and provide heuristics to evaluate (new) social situations. Socio-institutional relevance, therefore, does not derive from the objective existence of certain institutions or instruments. Rather, the individual perception of regional added values and the trust in various socio-institutional stakeholders involved in the (regional) energy transition are the determining factors. Thus, 'regional added value' is added as an independent factor to directly affect the acceptance in the model.

2.3. Trust and the mediator fairness

Lazakidou [28] indicates that "people may choose to perform a behaviour, even if they are not themselves favourable toward the behaviour or its consequences, if they believe one or more important referents think they should, and they are sufficiently motivated to comply with the referents" (p.145). Therefore, the behaviour or thoughts of people around us and/or who are important to us may determine our decision making or attitude towards other things [29]. Therefore, we assume that stakeholders relevant for the project may influence the perceived fairness, as long as they are trusted.

Not only the evaluation of technology itself, but also the way it is implemented (e.g., by whom, via which procedures, at which location) may influence acceptance [30]. The higher the perceived justice of an intervention is, the higher the acceptance of this intervention should be [11,31,32]. Therefore, a direct influence from fairness on acceptance is assumed [33,34]. Huijts et al. [30] emphasize the role of trust and (distributional and procedural) fairness on the perception of both, technology options and implementation procedures. They assume "when people know little about a technology, acceptance may mostly depend on trust in actors that are responsible for the technology, as a heuristic or alternative ground to base one's opinion on" (p.528). According to their schematic framework of technology acceptance, contextual factors like experiences (historical events might be included)

[2] Within the project the model was labelled to be heuristic.