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Are consumers willing to pay more for electricity from cooperatives? Results from an online Choice Experiment in Germany

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ABSTRACT

With liberalization in 1998, numerous firms have entered the German retail electricity market, including newly formed consumer cooperatives. Based on Transaction Cost Economics, we develop a theoretical framework seeking to explain preferences for electricity supplied by cooperatives from a consumer perspective. Drawing on a convenience sample of 287 German electricity consumers and Choice Experiment data from an online survey, we estimate Willingness-to-Pay values for organizational attributes of electricity suppliers, while accounting for observed and unobserved heterogeneity. Consumers in the sample exhibit a large Willingness-to-Pay for renewable energy. Our results also indicate a substantial Willingness-to-Pay for transparent pricing, participation in decision making, and local suppliers. Democratic decision making – a distinct feature of cooperatives – exhibits positive Willingness-to-Pay values for approximately one fifth of the sample. Taken together, our findings suggest a slightly higher Willingness-to-Pay for electricity produced by cooperatives. Limitations of applied sampling and other important aspects of energy transition are also discussed.

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1. Introduction

Over the past 15 years, German electricity supply has undergone significant changes, and a large number of new firms have entered the retail market [1–3], including consumer cooperatives, customer-owned businesses, that are generally distinguished from publicly-owned or investor-owned firms (IOFs). Consequently, today numerous German electricity suppliers not only differ in terms of prices, offered services, or energy mix, but also regarding how they are organized (i.e. their governance structures).

Empirical research on energy cooperatives in Germany has largely focused on practitioner problems and the production side [4–10], but rarely on the role of consumers. Theory-wise, a consumer perspective on the organization of enterprise can be built on Williamson's [11] argument that opportunistic and boundedly rational agents may require safeguards for organizing transactions. Controlling for other important characteristics of electricity (e.g. renewable energy share), we developed a Choice Experiment (CE)

to estimate consumer preferences and subsequent Willingness-to-Pay (WTP) values for governance attributes of electric utilities. In a CE, respondents take part in a survey and repeatedly choose between two or more alternatives describing the good to be valued, separated into its characteristics, generating data that can be used to estimate welfare measures for changes in attributes.

We included several governance attributes in our CE, such as decision-making structures and commitment to price transparency, which may help consumers to reduce transaction costs resulting from challenges present on electricity markets, such as non-competitive market structures in generation and transmission or information asymmetries. Our study focuses on Cooperative Governance as a means to economize on transaction costs [8,12], seeking to understand the recent success of electricity-supply cooperatives [10] from the consumer side of the transaction, especially in markets for renewable energy.

In Germany, energy cooperatives are predominately involved in producing electricity from renewable sources. It is, thus, particularly important to disentangle consumer preferences for renewable energy from preferences that are related to the cooperative enterprise, because the two have very different policy implications. In other words, we ask here whether policy makers should direct more attention to *what* is produced, i.e. electricity from renewable vs. non-renewable sources, or to *how*

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it is produced, i.e. electricity produced by consumer-controlled enterprises vs. private or publicly owned firms. Our study is explorative in nature, as the topic has not been researched so far. Hence, we relied on a small non-probability sample from students and employees at different universities to assure environmental awareness and high education standards.

Germany is Europe's largest economy and the fourth largest economy of the world. The German government has decided for a massive shift of the energy system which, under the term "Energiewende" (energy transition), has attracted a lot of interest from other countries. Beside technological progress in the field of renewable energy, societal change on various fields is required for a successful regime shift [13,14]. As shown by a recent survey, engineers have dominated the field of energy research and a focus on social science research is desperately needed. More specifically, fifteen promising fields have been identified that could advance our knowledge of energy systems [15]. In this context, our paper, by looking at consumer preferences for locally and collectively produced energy, contributes to an improved understanding especially in the fields of "geography and scale" and "institutions and energy governance." Further, as Sovacool points out, "consumer preferences are more complex than normal market approaches would suggest [...] and] the social dimensions of energy technology and use are worth greater attention" [15]. We also contribute to the literature on trust [16], control and decentralization [17] as well as the interactions of households and energy systems [18], where large gaps exist in energy research.

The German case presented in this paper has implications also for other countries. The European Union wants to achieve a low-carbon economy and various policy adjustments need to take place for achieving the required technological shift [19]. From a comparative perspective, our paper helps to understand differences between, on the one hand, countries like Germany or the Netherlands, which have some experience with renewable energy cooperatives, and, on the other hand, countries like Japan or the US, where there is a long history of energy cooperatives, but relatively little interest in renewable energy cooperatives (US), or little experience but a strong interest (Japan). The particular perspective of customers may also be of interest for some Scandinavian countries, especially for Denmark, where considerable parts of the energy system are controlled by citizens.

This paper is organized as follows. First, we develop a theoretical framework for analyzing Cooperative Governance in retail electricity markets and then describe our empirical approach, followed by presentation and discussion of results. The last section offers a summary and concludes.

2. Background and theoretical framework

2.1. Energy transition and cooperatives

The liberalization of electricity markets in 1998, in combination with the *Erneuerbare Energien Gesetz* (Renewable Energy Act) and the start of nuclear phase-out in 2002, set the framework for a process which is referred to as an "Energiewende" (energy transition) in the German public.¹ Some of its most visible outcomes have

been technical change (e.g. decentralized renewable-energy power plants), a retail market for renewable energy, and electric utilities competing for ways to promote further development of this energy transition vis-à-vis their customers [20].² It is, thus, not surprising that recent research on consumer electricity preferences has focused on WTP for renewable energy from different perspectives. Bergmann et al. [22,23], Roe et al. [24], Garcia et al. [25], Ku and Yoo [26], Yoo and Ready [27] and Longo et al. [28], among others, have investigated WTP for renewable energy in general. Borchers et al. [29] have accounted for differences in WTP from different sources. Externalities from wind energy have been studied by Meyerhoff et al. [30], Dimitropoulos and Kontoleon [31], Ladenburg and Dubgaard [32], and Álvarez-Farizo and Hanley [33]. Other sources like micro-generation and biomass have been studied by Scarpa and Willis [34], Soliño [35] and Soliño et al. [36]. Michelsen and Madlener [37] and Achtnicht [38] have looked at preferences for cleaner energy from a house owners' perspective.

Electricity from renewable energy sources has characteristics strongly resembling from credence goods. Due to information asymmetries, consumers cannot easily assess the utility from consuming such goods. While the utility from electric energy use is relatively easy to assess, it is difficult to assess the utility component of *renewables*, because this requires knowledge of the production process. Electric utilities may, thus, use tariffs for renewable energy to hide margins, resulting from information asymmetries and opportunistic behavior [39,40].

In the year 2000, Germany ratified a Renewable Energy Act (EEG). A key component is the feed-in-tariff (above average market prices) for producers of electricity from renewable sources. Costs for these subsidies are shared by consumers. Since its ratification, the law was amended several times. Another reform is planned for the current legislature [41]. The reform plans foresee a decrease in feed-in-tariffs especially for on-shore wind power, solar PV, and biomass. Tariffs for (large-scale) off-shore wind power installations remain relatively high. The law now also sets targets for additional capacities. For instance, the annual increase in generation for solar PV should be about 2500 MW and tariffs should be used to adjust these capacity targets. Taken together, the reform proposal favors private investors with a diverse product portfolio and may be a step back for many small-scale community-driven projects as it involves several price and policy risks. It remains to be seen, however, how exactly these plans will be put into practice.

Energy cooperatives experienced a recent boom in Germany. Between 2008 and 2012, the number of officially registered cooperatives in this field increased from less than 100 to more than 700 companies [10]. These are engaged in producing electricity from renewable sources, typically using solar PV or biomass [10]. They are embedded in a particular community, small in membership (usually less than 100 people), and, based on the German feed-in tariff, make most of their revenue from selling electricity. Members' decisions are made in the general assembly, and volunteering or professional managers are appointed in democratic elections.

cooperatives, is beyond the scope of this paper. For more information see Müller and Rommel [8]. The new coalition of social-democrats, Christian democrats, and the Christian socialist union, has planned a comprehensive reform of the Renewable Energy Act, including the substantial reduction of feed-in tariffs, especially for biomass. It remains to be seen how this reform will affect producers of electricity from renewables.

² In many Western countries, consumer preferences have changed over the last decades. For a relatively small but growing part of the population, social and environmental impacts of consumption choices play an increasingly important role. A recent overview focusing on the social aspects of "sustainable consumption" can be found in Seyfang [21].

¹ Please note that the nuclear-phase out was first introduced by a coalition of social-democrats and the green party in 2002. The law was then modified by a more conservative government in 2010. More specifically, the run-time for several nuclear power plants was extended. Following the events of Fukushima, in 2011, the same government reversed the decisions, again reducing the run-time of nuclear power plants with the aim of shutting down all remaining nuclear facilities by the year 2022. A detailed analysis of the legal aspects, such as the Renewable Energy Act, technical change, and its relationship to the recent rise of electricity

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