COLLABORATIVE CONSUMPTION IN ENERGY ISSUES – PV-OWNERS' PREFERENCES FOR RESIDENTIAL VS. COMMUNITY BATTERY STORAGE SYSTEMS

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Overview

Battery storage systems can help to balance the intermittency of renewable energy sources and facilitate the further integration of electricity from renewables. Storing electrical energy in battery systems is expensive, but the observed and expected reductions of photovoltaic and battery storage systems lead to excitement in the industry. Moreover, battery storage systems recently emerged as a new topic on the research agenda. Although uncertainty regarding price reductions exists and a discussion about the economic viability of storage systems is ongoing, battery storage systems have the potential to become disruptive innovations. An increasing demand for battery storage systems, e.g. in Germany, with around 15.000 installed residential storage systems in 2014 and around 20.000 new systems in 2015, shows that consumers are willing to invest in storage systems although prices are high. Storage systems have to become and be perceived as reliable and economically viable in order to reach a broader diffusion. Therefore, new business models and ownership concepts are needed. Different models of storage systems can be implemented, such as residential storage systems or community-based systems. Although residential storage systems are currently the most common option in on-grid applications, large-scale systems can offer benefits regarding grid operation as well as economic aspects over residential ones. However, consumers' preferences towards different storage concepts and their willingness to participate and invest in different types remain unknown.

In a representative pre-study, we found that over 60 percent of the German population state a positive attitude towards collaborative consumption models for electricity generation and usage, i.e. sharing. Findings on community-based energy projects support the development of new storage models such as shared community systems. In order to develop attractive products and foster the diffusion of storage systems, it is managerially important to analyze different product attributes of storage systems and investigate consumers' preferences. Relevant product attributes found in the literature are mainly economic factors, such as future cost savings on the energy bill, and self-sufficiency intentions. Environmental aspects such as the contribution to the energy transition in Germany are found to be relevant, but less influential. To find out which storage models are preferred by potential customers, we apply a discrete choice experiment. In our study, we analyze (1) different types of storage systems, (2) economic factors, (3) modes of ownership and payment, (4) control of the storage system, (5) the degree of self-sufficiency, and (6) different types of partner companies, e.g. for control and maintenance. Analyzing these factors can help to build new business models and support the diffusion of storage systems.

The paper is organized as follows: After the introduction, the second section gives a brief overview of the models of battery storage systems. The third section presents various aspects of storage systems that are important from a customer perspective. Important attributes are selected based on a literature review. In section four we describe the choice experiment and the results. In the final section implications for marketing and policy are derived.

Methods

We investigate consumers' preferences and willingness to pay for residential and community battery systems using a discrete choice experiment. An online survey (N=500) was conducted in Germany in March and April 2016. The target population of the study consists of (1) owners of photovoltaic systems, and (2) people that are interested in photovoltaic systems and are aware of battery storage systems.

Results

The results of a choice experiment conducted in Germany are presented. We expect preferences for low financial investments, and an openness towards different types of storage systems and different modes of ownership and usage, e.g. sharing. Respondents are expected to show a preference for a high degree of self-sufficiency. Moreover, control over the system is expected to play an important role for the intention to invest in residential and shared community systems. While control is important to consumers, they are willing to relinquish control, if economic incentives are given. Moreover, the type of partner, e.g. a utility, an energy cooperative or a specialized battery operator, is expected to be an important product attribute. Trade-offs between the different aspects analyzed are discussed, and willingness to pay results for the different attributes are presented.

Conclusions

Although prices for battery storage systems are currently high, innovative ownership and participation models, such as sharing a community system among different users, can become economically viable solutions. In addition, these new concepts could foster the diffusion of storage technologies. Shared community systems have benefits over residential ones, e.g. since the systems are not located within the private houses – lowering the perceived risks and the complexity of implementation. Although consumers are aiming for a high level of self-sufficiency, they are willing to give up the control of the storage system to a partner, e.g. a utility. Economic and practical factors incentivize the decision for a shared rather than an individually owned system. Community systems could be implemented as community energy projects, i.e. energy cooperatives, an important force in the German energy transition. In order to reach different customer groups, various types of investment and participation options would be needed. Currently, complex regulative issues hinder the joint usage of storage systems. Adjustments to the fees and regulations could foster the development of new business models and the diffusion of storage systems.

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