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Willingness to pay for electromobility: an investigation among owners of energy-efficient houses

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Abstract

This paper adds to the body of knowledge about house owners in Germany as potential early adopters of electric cars. With the help of energy efficiency standards for new constructions, interviewees were divided into two groups: owners of energy-efficient houses and owners of conventional houses. Both groups were asked to take part in a choice experiment and to choose between a conventional car, a plug-in hybrid electric car and a battery electric car in different hypothetical choice situations.

Results show that facing the situation to replace their present car house owners of both groups tend to choose a larger and more powerful car. Further, there is a tendency within both groups to choose a car with less fuel consumption. The results of the discrete choice experiment indicate that owners of energy-efficient houses have a statistically significant higher willingness to pay for plug-in hybrid electric cars and for battery electric cars with or without a range extender.

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1. Introduction

For a successful introduction of sustainable electromobility, it is important to know promising target groups. Owners of private homes have always been of interest since their cars can be linked straight forward to the grid. A recent survey (Frenzel et al. 2015) among German electric car owners shows that particularly well-educated people working in a full-time job, gaining an above average income and living in detached houses in small or medium-sized

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towns have bought electric cars. Many of these private users are ecologically aware and nearly half of them own a photovoltaic system.

The study presented here intends to add some further knowledge to describe early adopters of electric cars, especially plug-in hybrid electric cars (PHEV), battery electric cars (BEV), and range extended electric cars (REEV), among house owners. It focuses on owners of energy-efficient houses. In addition to the above mentioned characteristics of early adopters they can be assumed to have some technical knowledge and, therefore, they know that the first step towards energy-efficient housing is to reduce energy consumption.

In this regard, two questions arise: Firstly, whether those who build more energy-efficient houses will be more willing to reduce their automobile energy consumption. Secondly, whether their willingness to pay for electric cars will be higher compared with owners of less energy-efficient, conventional houses.

To answer these two questions the paper is structured as follows. In section 2 the German policy concerning electromobility is outlined as well as the policy concerning energy-efficient construction. In section 3 details on the method applied are given and a sample description is provided. Results are presented in section 4 providing insight to the two main research questions. Finally, in section 5 the paper is summarised, conclusions are drawn and an outlook for further research is given.

2. Policy context

2.1. Target for one million electric vehicles by 2020 in Germany

In 2009 the German Federal Government adopted a National Electromobility Development Plan. The aim is to have one million electric vehicles on German roads by 2020. Though, the definition of electric vehicles comprises not only cars and light commercial vehicles but also two-wheeled vehicles (like personal human transporters and electric bicycles) and microcars which use electricity as a main source of energy. (German Federal Government 2009)

It was planned that 100,000 electric vehicles were driving in Germany by the end of 2014. In fact, only about 24,000 electric cars were operated by that time. (Nationale Plattform Elektromobilität 2014)

In 2015 the Electric Mobility Act (Elektromobilitätsgesetz, 2015) was adopted to increase the attractiveness of electric vehicles. Specific privileges as special parking rules and regulations (e.g. exceptional allowance for parking or discount on parking fees), the use of reserved lanes (e.g. bus lanes) as well as special access rights to restricted areas are possible. Under the new act local authorities are entitled to privilege electric vehicles in their area for the first time.

2.2. Promotional programs for the construction of new energy-efficient houses in Germany

The building stock in Germany has to be climate neutral by 2050 due to a target set by the Federal Government. One step towards target achievement is the introduction of energy obligations for new buildings. These energy efficiency requirements are defined in the Energy Saving Ordinance (Energieeinsparverordnung, EnEV, 2007) and the Energy Saving Act (Energieeinsparungsgesetz, EnEG, 2005). From 2021 all new buildings in the European Union have to be nearly zero-energy buildings (Directive 2010/31/EU).

Actual requirements for new constructions concerning the maximum annual primary energy need for heating, hot water, ventilation and cooling as well as the maximum transmission heat loss are laid down in the EnEV. The EnEV describes the minimum requirements for new buildings. These requirements have been and will be updated for achieving the targets mentioned above. The last update was in 2014, when the current EnEV 2014 entered into force and replaced the EnEV 2009.

There are promotional programmes for the construction of new energy-efficient houses in Germany. Energy-efficient in this context means less energy consumption than the minimum requirements laid down in the EnEV. For owners of those houses the KfW Group (Kreditanstalt für Wiederaufbau) promotes specific financing products depending on the level of energy efficiency. Therefore, different energy efficiency standards exist for new constructions: A KfW Efficiency House 70 (or 55 or 40) consumes only 70 % (or 55 % or 40 %) of the maximum

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