May I? Enabling the sharing of private charging infrastructure.

Paul Fabianek, Institute for Future Energy Consumer Needs and Behavior (FCN), RWTH Aachen University, +49 241 80 49838, paul.fabianek@eonerc.rwth-aachen.de
Rüdiger von Nitzsch, Institute for Decision Research and Financial Services (EFI), RWTH Aachen University, +49 241 80 96174, nitzsch@efi.rwth-aachen.de
Reinhard Madlener, Institute for Future Energy Consumer Needs and Behavior (FCN), RWTH Aachen University, +49 241 80 49820, RMadlener@eonerc.rwth-aachen.de

Overview

The adoption and use of battery electric vehicles (BEVs) depend heavily on being able to (re)charge conveniently and reliably. However, German BEV drivers today observe congestion at the public charging stations (CSs), especially in urban locations during rush hours and due to the lack of public CSs in rural areas. In addition to the public CSs, there are far more private CSs that are currently mainly used by their owners. However, these owners usually use their private CSs only during specific periods of the day to charge their BEVs. Allowing the public to use private CSs would significantly increase the availability of charging infrastructure throughout Germany and would increase the utilization of existing capacities (see sharing economy). To make this possible, the owners of private CSs and the third-party users of these CSs would have to agree on the general conditions of use. In addition, software and hardware solutions would have to be created to enable sharing of private CSs. In this study, we investigate the objectives systems and preferences of the parties involved in private CS sharing. The goal is to bring these parties together and provide solutions for conflict-free and easy sharing of private charging infrastructure.

Methods

Interviews were conducted in advance with the few entrepreneurs who attempted to provide a solution for sharing private CSs. These interviews addressed the requirements and inhibiting factors from an entrepreneurial perspective. The next step was to conduct a workshop with five BEV drivers owning private CSs and another one with five BEV drivers without the possibility to charge at home. In order to systematically and reflectively determine the objectives systems and preferences of the participants with respect to the sharing of private CSs, we apply value-focused thinking using the online decision aid tool "Entscheidungsnavi" during the workshops. This decision-making tool was developed by Professor Rüdiger von Nitzsch and his team at RWTH Aachen Univerity based on the Multi-Attribute Utility Theory (MAUT). Based on the results of the two workshops, alternatives for the design of CS sharing solutions were elaborated.

Results

Our results indicate that CS sharing must be straightforward, contactless, and reliable to be mutually accepted. The framework conditions should be communicated in a binding and transparent manner by owners of private CS. Exceeding the stated time of use of CSs seems to be of particular concern to owners of private CSs. Smartphone applications are preferred for practical implementation. In principle, business models are conceivable on the intermediary side between private CS owners and users.

Conclusions

Private CSs enable their owners to charge their BEVs reliably and conveniently. These criteria must be satisfied despite the sharing of these private CSs in order to guarantee sufficient acceptance. Usage tariffs should be customizable to consider the mobility needs of the CS owners. These tariffs must be communicated transparently and be binding on both users and owners of the CSs. In addition to clear and binding communication between the parties involved, the dismantling of regulatory barriers (e.g., measurement accuracy and conformity with submetering law for CSs) could accelerate the rollout of sharing solutions. Furthermore, early consideration of the

possibility of CS sharing can be helpful during later implementation (e.g., installing a wallbox outside the garage and thus making it publicly accessible).

References

Fabianek P., von Nitzsch R., Madlener R. (2023) “May I? Enabling the sharing of private charging infrastructure”, *FCN Working Paper*, Institute for Future Energy Consumer Needs and Behavior, RWTH Aachen University, Aachen, Germany (in prep.).

Höfer T., von Nitzsch R., Madlener R. (2020) „Using Value-Focused Thinking and Multicriteria Decision Making to Evaluate Energy Transition Alternatives“, *Decision Analysis 17(4):* 277-375.

Mont O., Palgan Y. V., Bradley K., Zvolska L. (2020) “A decade of the sharing economy: Concepts, users, business and governance perspectives”, *Journal of Cleaner Production 269*: 1-9.

Ritter M., Schanz H. (2019) “The sharing economy: A comprehensive business model framework”, *Journal of Cleaner Production 213*: 320-331.

Von Nitzsch R. (2023) “Entscheidungsnavi Website”, https://entscheidungsnavi.de/