How can new business models be technically realized to provide flexibility in the future German energy system?

(3) Integrierte Netze der Zukunft

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Motivation and Research question

The transition to high shares of renewables leads to high demand for flexibility in the energy system. This flexibility might be fulfilled among other options by small-scale assets such as residential heat pumps and electric cars, potentially leading to new business models in this area. In the project C/sells, these types of new business models were analyzed both conceptually and in real-life field demonstrations. The aim of this work is to identify and compare the technical implementation of different new business models from C/sells, to highlight challenges and to identify relevant (new) technical components for the future German energy system.

Methodology

To answer the research question, a methodology based on four steps is applied: First, expert interviews on current marketing opportunities for flexibility like spot markets and balancing services and their technical realization are conducted (see [1-5]) – accompanied by a literature review – which in the second step lead to a framework of a typical process of energy flexibility marketing. This framework can be used to map the new business models of C/sells which allows a comparison of the different business models, ultimately leading to the identification of new relevant technical components. The analysis of the business models is performed via interviews (see [6-8]). These new technical components are analyzed in a final step by identifying current challenges and their potential for the future German energy system. The last step is performed with an interview [9] as well as a literature review [10-13] and resultant potential estimations.

Results and Conclusion

Based on expert interviews on the current spot markets and balancing services, a process framework (see Figure 1) is identified on how the technical realization is performed. Relevant for the technical implementation are on the one hand the data collection at and switching of the asset and on the other hand the data transmission between the different players. The new business models of C/sells cover only a part of the identified framework, due to on one hand the partial realization in real‑life field demonstrations and on the other hand the concepts themselves. Nevertheless, there is enough overlap to identify relevant (new) technical components by comparing the different approaches.



Figure 1: Process Framework

For data transmission between the different players excluding the assets, existing data transmission standards from current markets / services were used. However, there are currently no standardized solutions for connecting and switching small-scale assets, which leads to a wide dispersion of technical infrastructure in the new business models. Nevertheless, two new components for different steps in the process framework can be identified: Smart metering infrastructure for data collection and switching and LTE as a data transmission standard between small-scale assets and the other players. The smart metering infrastructure still needs further development for future scalable implementation, as the currently certified version is not sufficient. However, development is going on, so a new certified version can be expected soon. The use of LTE in the energy industry currently still presents some challenges, such as incomplete LTE coverage in Germany and acceptance problems for the use of LTE in the energy industry, which can, however, be addressed in future. Even with large-scale deployment, no bottlenecks are to be expected due to the LTE infrastructure, as was shown based on the ALF concept (see [6]). Therefore, both – smart metering infrastructure and LTE standard – might become important components for business models providing flexibility in the future German energy system.

Literature

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