

Designing a new governance for consumers to facilitate their participation in the energy system

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Relevant AAEE topic: Relevant Economic analysis of smart buildings and the energy community concept

Overview

The increasing number of flexibility and generation assets owned by the households does not necessarily result in a greater flexibility and electricity offer for the energy system, as the households are not in a position of participating in the energy system. Private arrangements are emerging to facilitate participation and constitute new governance for the consumers. The consumer governance framework aims to reveal the modular structure of those arrangements and set the stage for an evaluation of the impact of the governance design on the consumers' participation. The key elements of the framework, the design element, and consumers' objective checklists, are derived from a literature review. The six identified design elements are information provision, operation automation and interaction with the consumer, matching of electricity and flexibility, investment orchestration, allocation of costs and benefits, and risk allocation. Examples for the specifications of the design elements are provided. The key objective of the consumers is summarised as the reduction of the cost (energy supply, investment, and transaction cost) and the increase of the benefits in form of a secure, decarbonized, independent, transparent, and data safeguarding energy supply. The weight of the objectives depends on the individual and contextual factors of the consumer. The application of the framework is demonstrated by three existing arrangements, the local trading platform Pebbles, the virtual power plant Next Kraftwerke and the energy community EWS Schönau.

Methods

The framework is developed for revealing the modular structure of the private arrangements and evaluating its impact is developed based on a literature review. To structure the results from the literature, the consumers' objectives for participating in the energy system are selected as starting point. On the one side, the evaluation criteria is selected to evaluate the objectives. On the other side, measures to fulfill the objectives are derived and aggregated as design elements.

Results

The resulting framework aims to be applied by using three guiding questions:

1. How are the **design elements** for the consumer governance specified?
2. What are key **objectives by the consumers** for their participation in the energy system?
3. How does the **governance design** meet the **objectives by the consumer**?

The guiding questions are substantiated by a list of design elements and possible specifications, as well as common objectives by consumers that need to be specified & weighted for every case.

Design elements

Design elements	Design options and examples for design specifications
Information provision	Ex-ante & from consumer to provider: Contractual preference for electricity supply Ex post & from consumer to provider: Data sharing agreement Ex-ante & from provider to consumer: Tariff design Ex post & from provider to consumer: Billing information
Operation automation and interaction with consumer	One time interaction and direct enforcement: Automated electricity supply Frequent interaction and direct enforcement: Smart charging of electric vehicles Frequent interaction and indirect enforcement: Consumption recommendations for white goods
Matching of electricity and flexibility	Aggregation for established markets: Virtual power plants Local markets and congestion management: Flexibility market Local markets and electricity trading: Local electricity supply Virtual markets and electricity trading: Green electricity supply
Investment orchestration	Ownership: Private, public Compliance rules: Access regulation or usage rights
Allocation of costs and benefits	Market-based: Pricing rules Business model based: Bonus or fees Infrastructure cost: Grid tariffs, smart meter fees Regulated cost: Taxes, levies
Risk management	Risk hedging: Capacity subscription Risk minimization: Storage investment Risk acceptance: Consumption curtailment

Consumers' objectives

1	<i>Reduce the costs</i>	2	<i>Increase the benefits</i>
1.1	Reduce the supply cost	2.1	Maintain reliable energy supply
1.2	Reduce investment cost	2.2	Decarbonise the energy supply
1.3	Reduce the transaction cost	2.3	Create independence from incumbent players
		2.4	Safeguard data privacy
		2.5	Create transparency

Conclusions

By reducing the effort and complexity, creating additional values, or safeguarding their interests and beliefs, the governance options address different households. Incentive schemes that go beyond homo economicus, optimization enforcement, co-determination requirements, and data access are examples of design elements. The decomposition reveals the modular structure of the arrangements, as well as highlights common and distinctive features among them. The created inventory aims to set the ground for future evaluations, as well as discussions on the new role of households in the energy transition and its facilitation.

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