The best defense is a good offense: Prosumer communities as a business strategy for electric utilities

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Introduction: The increasing decentralization tendency is empowering consumers to generate their own electricity (becoming so called prosumers) and consequently to reduce their energy demand from the grid. Besides self-consumption of locally produced electricity within individual households more advanced concepts such as "prosumer communities" have been developed. A "prosumer community" is a group of households that are organized together to deploy energy from a common decentralized generation system such as a photovoltaic (PV) panel. A common example is the case of multifamily houses, where the electricity produced in the roof can be used and shared among several housing units.

This paper investigates the diffusion of prosumer communities and answers the following questions: How can the traditional utilities react to prosumer communities? And how can they adapt their business strategy in order to maintain their competitiveness?

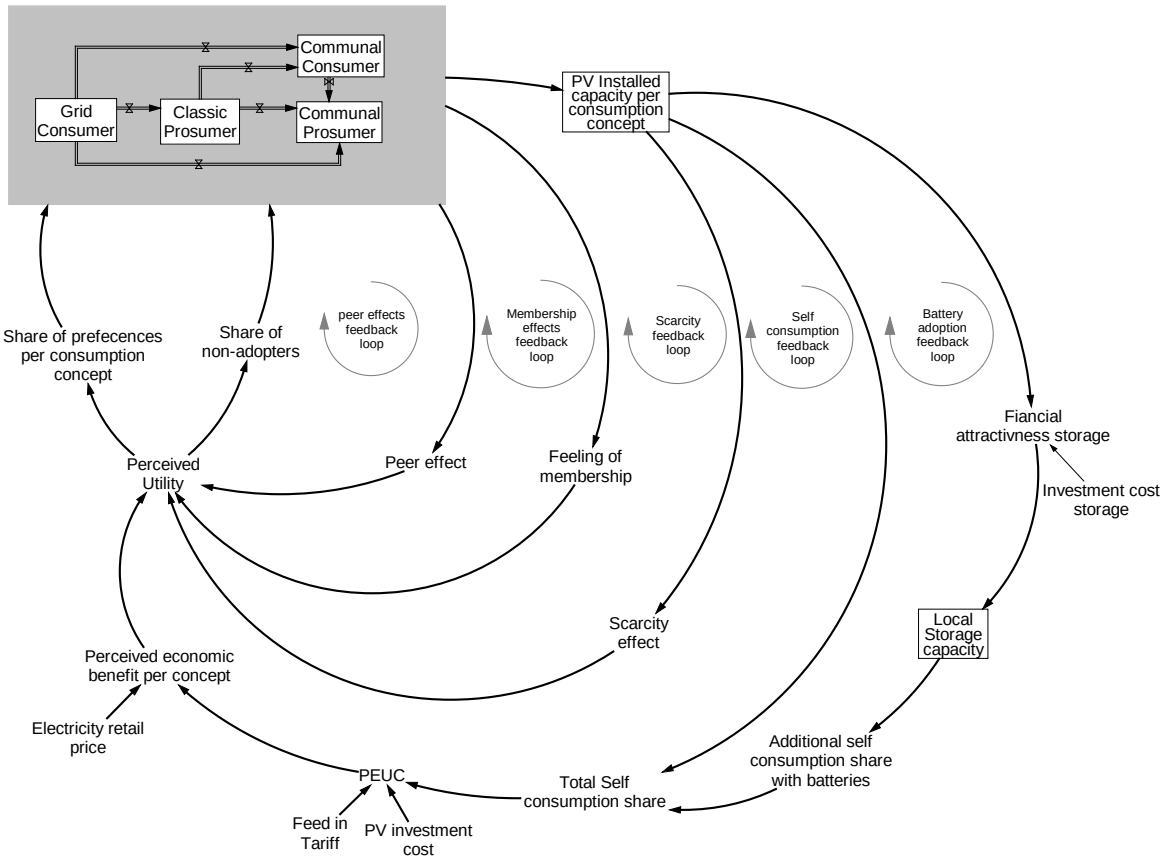
Model description: The model considers four consumption concepts. The conventional "Grid consumer" the "Classic Prosumer". The "Communal Prosumer" and "Communal Consumers" who belong to the "Prosumer community". The figure below represents the causal loop diagram of the model. The "self-consumption feedback loop" models the customer decision by comparing the utility of the different consumption concepts. The utility of a concept considers among other factors the perception of the economic benefits. To evaluate and compare the near term economic benefits of the different consumption concepts we use the prosumer electricity unit cost (PEUC) developed by (Pillai *et al.*, 2014).The "Battery adoption feedback loop" assesses the installation of batteries from a techno-economic point of view. The "Scarcity feedback loop" represents the scarcity effect arising from the maximum PV capacity that can be installed in the analyzed area.

Additionally, the influence of the network effect related to the decision of house owners to install a photovoltaic power plant as represented by the "peer effect feedback loop". We use the empirical insights from (Bollinger and Gillingham, 2012) on the influence of peer effects on the adoption of PV panels and the model structure (Kubli and Ulli-Beer, 2016) to simulate peer effects.

A comparable structure is used in the "membership effects feedback loop". This reinforcing feedback loop represents the "community identity" that accelerates the adoption of the prosumer community concept.

Business model strategies: In this work, we examine different business strategies that can be used by utilities as a response to the emergence of prosumer communities: a business as usual (BAU) strategy, a policy resistance strategy and a new business strategies.

The BAU strategy is a wait-and-see strategy in which the utility takes no action while the customers decide to organize new "prosumer communities". In the policy resistant strategies, utilities can take several measures such as decreasing the feed-in tariff to slow down or the development of decentralized generation.



Finally, the new business strategies analyze the implementation of three different business models. First, we consider a roof rental scheme in which the utility rents free roofs and installs PV systems on them. The house owners as well as the tenants are encouraged to use the electricity that is directly generated on their roof. A second strategy evaluates the role of the utility as service provider for the prosumer communities. The last option considers the effect of partially financing the upfront costs of the PV system by the utility company, which is traded against the surplus electricity.

Results: The results provide evidence that the development of prosumer communities will surge in the following years. We show that utilities can react to this electric decentralization by implementing resistance strategies such as reducing the feed-in tariff. However, these strategies can only slow-down the diffusion of PV; they will not prevent it.

For this reason, we examine different business strategies that utilities can consider to obtain a better financial position, while at the same time promoting the formation of prosumer communities. Comparing the revenues from the resistance strategies and the different business strategies shows that the development of new business areas in the decentralization field could lead to higher financial benefits than the attempt to block the diffusion of PV. This indicates that a good defense for the utilities against the decentralization threat is a good offense. This means that incumbent utilities can improve their competitive position by adjusting their business model and actively participating in the decentralization of the energy system.

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