



Drivers and household characteristics amplifying the solar rebound effect

At the European level, the importance of citizens in the energy transition has long been recognized. With the adoption of Directive (EU) 2018/2001, citizens were placed at the center of the energy system, as they can act individually or collectively as prosumers—no longer only consuming energy, but also producing, sharing, and storing energy. With the growing importance of prosumers, it becomes ever more important to understand prosumer behavior and to support households in adopting a responsible and system-oriented role. One challenge identified in previous research, but not yet sufficiently explored, is the rebound effect, whereby part of the generated energy is negated by increased consumption.

In this study, we investigate the drivers of the rebound effect and identify which households are particularly prone to it. In a field study involving 64 German households, we tracked electricity consumption before and after PV installation and collected data on the attitudes, motivations and structural changes in the households at regular intervals. The rebound effect, defined as the share of self-generated electricity consumed by increased electricity use, could be calculated for 15 households and stood at a median of 4,3%.

The results indicate that environmentally conscious individuals tend to increase electricity consumption more than those who install PV systems for financial reasons or to enhance self-sufficiency. Increased consumption might be explained by the observation that many prosumers do not consider the use of self-generated electricity to be ‘consumption’ and therefore do not apply the principle of sufficiency to it. In addition, a large majority (77%) of households believe that feeding electricity into the grid is not worthwhile. While we observed a correlation between the monitoring of consumption data, the presence of the topic of energy efficiency and the adjustment of consumption to one's own generation, we could not identify a (negative) correlation with electricity consumption. Beyond the direct rebound effect, our findings also point to an indirect rebound effect through moral licensing, manifested in more relaxed consumption behavior in other domains.

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