AGENT-BASED MODELING OF THE DIFFUSION AND ADOPTION OF DYNAMIC ELECTRICITY TARIFFS

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To adjust today's power system to the increasing presence of distributed renewable energy sources and expectations of the societies and politicians (e.g. Climate Policy 3x20), various demand side management tools have been proposed. Among them dynamic tariffs – like time-of-use tariff and critical-peak-pricing – intended to flatten the demand curve and to shift the load from on-peak (day) to off-peak (night) hours. On one hand dynamic pricing can bring benefits to consumers ($\rightarrow$ potential savings, satisfaction from being ecological), on the other to electricity retailers and distribution system operators ($\rightarrow$ lower investment and operational costs). However, as many pilot programs and surveys conducted in recent years have shown, it is quite difficult to convince people to switch to the new tariffs and to get them really involved.

Using an agent-based modeling approach we study the temporal dynamics of consumer opinions regarding switching to dynamic electricity tariffs and the actual decisions to switch. We assume that the decision to switch is based on the unanimity of τ past opinions. The resulting model offers a hypothetical, yet plausible explanation of why there is such a big discrepancy between consumer opinions, as measured by market surveys, and the actual participation in pilot programs and the adoption of dynamic tariffs. We argue that due to the high indifference level in todays retail electricity markets, customer opinions are very unstable and change frequently. The conducted simulation study shows that reducing the indifference level can result in narrowing the intention-behavior gap. A similar effect can be achieved by decreasing the decision time that a consumer takes to make a decision.

[1] A. Kowalska-Pyzalska et al., Energy Policy 72, 164-174 (2014).

[2] P. Przybyła et al., Advances in Complex Systems 17(1), 1450004 (2014).