UNIVERSITÄT LEIPZIG

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Call for thesis:
Modelling the Diffusion of Rooftop PV Systems: Hypotheses & Component Investigation

Motivation

In 2020, the primary energy consumption of private households amounted to 27.4%, showing the importance of household-level decarbonization for successful energy infrastructure transformation. Arguably, technological innovation and their adoption by private households can have a large impact on the environment and climate change mitigation.

While institutional change largely depends on (rational) arguments and the influence of ‘green’ behavior on an institutions’ image, the behavior of private consumers is a complex amalgamation of opinion dynamics, societal and peer pressure, perceptions, preferences, advertisement and a large range of cognitive factors.

Understanding the behavior and decisions of consumers is not only important for successful product launch planning, but also for actors in the public sphere promoting climate change mitigation. Agent-based modelling (ABM) of innovation diffusion has shown to give insight in these dynamics and to assess strategies to address these questions.

Background

In order to address this issue, the chair of Energy Management & Sustainability developed the agent-based innovation diffusion framework IRPact, aimed at easy and flexible development of models on the diffusion of sustainable products. As an instance of this framework, the rooftop photovoltaic (RPV) adoption model PVact offers a parameterized basic model and tools for modelling policy instruments, behavioural drivers, socio-demographic and geographical structures, as well as many other research questions.

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Goal

The goal of this thesis is to formalize own hypotheses and model components and to design, execute, evaluate and analyse different scenarios for the use within the PVact and IRPact model/framework within the context of residential rooftop PV diffusion. The chair offers the core model, the necessary infrastructure to execute and evaluate it, and guidance in model implementation and execution.

For this thesis, you can contribute your own research questions and hypotheses to develop own model variations within the modular design of the process model. This could entail variations of parts of the decision process, the decision components, communication or social influence mechanics, the social fabric, economic assumption and much more. For this thesis, a clear research question and hypothesis is mandatory.

Your profile

You should be interested in transdisciplinary questions, most preferably in an environmental field. You should be willing to have both a view for the system as a whole and identifying its constituents, as well as their interconnections. You should not be averse to numbers and formulas, but at the same time have an integral view of the social and environmental aspect of a system. Writing the thesis in English is strongly preferred; however, it is possible to write the thesis in German as well.

It is strongly advised that you would've attended the course 'Modeling in Resources Management' or have comparable background in agent-based modelling or practical modelling experience. While developing a model is not part of the thesis, creative and analytical work on an extensive model is.