A Multi-agent System Framework for Stakeholder Analysis of Local Energy Systems

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Abstract : The development of local energy systems requires the collective involvement of different actors from various levels of society. However, the stakeholder analysis of local energy systems still has been under-developed. This paper proposes an multi-agent system (MAS) framework to facilitate the development of stakeholder analysis of local energy systems. The framework takes into account the most influencing stakeholders, including prosumers/consumers, system operators, energy companies and government bodies. Different stakeholders are modeled based on agent architectures for example the belief-desire-intention (BDI) to better reflect their motivations and interests in participating in local energy systems. The agent models of different stakeholders are then integrated in one model of the whole energy system. An illustrative case study is provided to elaborate how to develop a quantitative agent model for different stakeholders, as well as to demonstrate the practicability of the proposed framework. The findings from the case study indicate that the suggested framework and agent model can serve as analytical instruments for enhancing the government's policy-making process by offering a systematic view of stakeholder interconnections in local energy systems.

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