

Boosting Heating Prosumers' Welfare Gains: Integrating Solar Thermal Energy with Photovoltaics and Heat Pumps

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Extended Abstract

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Abstract Summary

This paper develops a theoretical model to analyze thermal comfort and electricity consumption at the household level, incorporating solar thermal systems, heat pumps, solar PV, thermal storage, battery storage, and grid use. We evaluate multiple adoption scenarios available to households, quantifying the economic surplus generated by each configuration. Results show that, before considering installation costs and related subsidies, the most profitable scenario is when the household adopts solar thermal with solar PV, a heat pump, battery storage, and thermal storage, as it yields the highest profitability. However, once installation costs and subsidies are incorporated, the most profitable scenario becomes the combination of solar thermal, thermal storage, and solar PV. The analysis highlights the crucial role of targeted renewable subsidies, particularly for heat pumps and solar thermal technologies, in promoting their adoption and enhancing cost-effectiveness. A redistribution of these subsidies is necessary to avoid the deadweight loss effect, which will then enable policymakers to increase subsidies for solar PV and battery storage.