



One Rate Does Not Fit All: An Empirical Analysis of Electricity Tariffs for Residential Microgrids

by

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Highlights:

- We empirically analyze twelve electricity tariffs for residential microgrids.
- We advise against volumetric tariffs and encourage capacity and fixed charges.
- We find that time-varying rates destabilize load profiles.
- We argue that time-varying rates can be attractive if combined with capacity charges.

Abstract

Residential microgrids are poised to play an important role in future distributed energy networks. However, energy retailers have yet to identify effective electricity tariffs to incorporate residential microgrids into the energy value chain. For this reason, we have chosen to analyze a set of twelve representative tariff options retailers might offer in the future. To examine their effects on load profiles and electricity bills, we set up a comprehensive empirical evaluation framework. Our analyses identify three important recommendations for residential microgrid pricing: First, energy retailers should not offer volumetric tariffs as they result in higher electricity bills, encourage sharp peak loads, and fail to fully allocate system costs. Second, they should also be cautious in offering time-varying and especially real-time rates. Although these rates promise slightly lower energy bills for microgrid operators, they can destabilize load profiles if retailers fail to simultaneously introduce peak-moderating capacity charges. Third, energy retailers should consider tariffs with capacity and customer charges, which we find to lower electricity costs, foster peak shaving, and facilitate stable cost allocation.

Keywords: Capacity Charges, Electricity Tariffs, Residential Microgrids, Simulation, Smart Electricity Markets, Time-Varying Rates