Electricity Retail Rate Design in a Decarbonized Economy An Analysis of Time-Of-Use and Critical Peak Pricing

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Currently, most U.S. electricity consumers pay a constant price per kWh consumed that accounts for most of their bill. Ongoing developments in the power system increase efficiency gains that can be made from exposing consumers to widely varying wholesale spot prices. Pure spot pricing is not popular; consumers (and politicians) value price predictability and bill stability. We focus on second-best alternatives: time-of-use (TOU) and critical peak pricing (CPP). We introduce alternative assessment criteria tailored to a context with increasing intraday shiftable loads. Using historical data from CAISO, ERCOT and ISO-NE, we find that out-of-sample daily Spearman rank correlations between TOU rates and spot prices can be relatively high (averaging 0.7-0.8), and simulations confirm that TOU rates can reasonably replicate efficient load-shifting incentives (up to 60-70% of the potential). Our analysis suggests that TOU rates, especially when complemented with CPP, can be considerably more socially valuable than previously estimated.

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