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Title: Using Prepayment Plans to save energy and reduce emissions - An evaluation of results in the Midwest

Abstract: The standard approach that utilities use to bill most of their customers for their energy use has largely remained unchanged since the industry began. Customers typically receive a bill for about 4 weeks of energy usage after they have already consumed that energy. This traditional approach has several downsides for customers, as they are often surprised by their usage and costs as they lack real-time insight into the impact of their household's consumption behavior and home's characteristics on those costs. There are also downsides for utilities since this arrangement can negatively impact customer satisfaction, increases the potential for unpaid bills and inhibits customers' ability to get fast feedback that could inform their efforts to save energy and reduce their GHG emissions. Pre-Payment programs have become one strategy to address these issues. These programs allow customers to pay for their energy use by adding funds to an account before energy is consumed and also provide frequent feedback to customers on their prior day's usage, costs, and remaining balance. Pre-pay programs informed by the theory that as customers gain information about how their consumption affects their account balance, they will be much more mindful of their energy usage. This can lead to greater efficiency in energy use and a reduction in GHG emissions. While pre-pay programs have been shown to reduce energy use in summer months, existing research is limited in size and mostly confined to warmer regional climates. Differences in geography and climate are hypothesized to yield varying results. In this research, we examine the energy impacts for customers enrolled in a pre-pay plan at a large Midwest electric utility. Using monthly billing data, we estimate savings by comparing Prepay customers to a matched control group of customers on a standard utility rate. We match Prepay customers to control group customers using Imbens propensity score matching on historical energy use and demographics. Impacts are estimated using a post-only regression model with pre-period controls. Surveys delivered to participants are used to characterize behaviors as energy efficient or energy use curtailment. This research informs existing research by expanding the geography and sample size of pre-pay studies, which may be beneficial for informing pre-pay design for utilities and their customers, and by connecting those impacts to self-reported energy saving behaviors. By focusing customer attention more directly on the connection between energy consumption and cost, utilities can reduce carbon emissions and energy consumption.