Evaluation of evolving residential electricity tariffs

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ABSTRACT: Residential customers in California’s Pacific Gas and Electric (PG&E) territory have seen several electricity rate structure changes in the past decade. This paper:
• examines the history of the residential pricing structure and key milestones,
• summarizes and analyzes the usage between 2006 and 2009 for different baselines/climate areas,
• discusses the residential electricity Smart meter roll out, and
• compares sample bills for customers in two climates under the current pricing structure and also the future time-of-use (TOU) structure.

Table 1: Breakdown of the PG&E baseline territories, areas, and key milestones for customers who receive both natural gas and electric.

Table 2: Summary and analysis of historical tier prices, average normalized customer usage in different tiers, and changes for 2006-2009. Baseline territories are aggregated into four areas that share similar characteristics: coastal, hills/mountain, valley-inner, and valley-outer.

Table 3: Summary of historical tier prices, average normalized customer usage in different tiers, and changes for 2006-2009. Baseline territories are aggregated into four areas that share similar characteristics: coastal, hills/mountain, valley-inner, and valley-outer.

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Figure 1: Map of PG&E baseline territories in California as of 2010.

Figure 2: PG&E’s tiered electricity pricing structure (2000 to 2011).

Figure 3: PG&E’s proposed timeline for transitioning residential customers to TOU pricing.

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To read Table 2:
The normalized customer usage is calculated as the total usage consumed in each tier (kWh/a) in each of the four aggregated areas divided by the number of customers in the same area.

5-TIER PRICING V.S. TOU PRICING (Peak Day Pricing and Peak Time Rebate): Most customers will transition from 5-tier pricing to Peak Time Rebate (PTR) then to TOU pricing (PDP), unless they opt out to PTR. The default will be PDP, with real-time pricing due to start in 2020.

5-Tier pricing:
• Tier 1 = 10% of the historical average usage. In kWh/day, of customers in baseline area.
• Monthly bills are the sum of daily usage which may be comprised of electricity purchased at multiple tiers
• No TOU differentiation

Peak Day Pricing (PDP)
• “Peak days” may be in summer or winter
• Between 9 and 15 peak days per year and only between 1400th and 1600th hour
• Based on the 5 tiers
• TOU charges and credits possible

Peak Time Rebate (PTR): similar to PDP but incentivizes only
• no penalties if the customer does not check demand during a peak day
• will be the default tariff for those who opt out of PDP

LIMITATIONS AND CONCLUSIONS OF HISTORICAL ANALYSIS:
• Lack of long-term data
• No data on PG&E customers examined at the yearly level.
• Potential summer peaks and behavior variability not taken into account.
• Smart meter customer data is those with historically necessary increased usage (e.g., 24/7 electricity consumed) and per capita data was included as part of the examined population.

INTRODUCTION OF RESIDENTIAL SMART METERS: One of the necessary checks towards the implementation of Time of Use (TOU) tariffs for the summer of 2010 is the installation of smart meters. In the remaining of this paper, we discuss 3.8 million residential smart meters and 1.3 million analog meters in service in the PG&E territory.

Customer complaints with smart meters:
• Smart meters are not causing the loads to rise.
• Safety and privacy issues (i.e., what downloading of usage data means).

Table 4 shows the preliminary analysis of 1,970 complaints regarding PG&E’s Smart meter program. While preliminary, the analysis suggests that despite the vocal complaints from thousands of customers, the Smart meters are accurate.

Projected range of annual PDP bill impacts are shown in Figure 6 below. Approximately 26% of the residential customers will have an annual bill savings when compared to the current 5-tier pricing. Approximately 65% will see an increase.