Dynamic Pricing: A Framing Document

Kansas Corporation Commission
Workshop on Energy Efficiency
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Objectives of Dynamic Pricing:

- Signal to customers the times of the day, week, season and year when electric power production costs are higher or lower than average, and influence customers' choices to consume electricity based on that information.
- Promote energy efficiency and demand response investments by customers intended to avoid consumption at times when production costs tend to be higher.
- Convey to consumers consistency between energy efficiency programs and pricing policy.
- Avoid a backlash of resistance to unfamiliar pricing, confusing equipment at the customers' premises and unintended bill impacts.

Background Documents Included Here:
National Action Plan for Energy Efficiency Report, July 2006, Chapter 5 [1]
Ahmad Faruqui, "Pricing Programs: Time of Use and Real Time"[2]

About Dynamic Pricing
"Dynamic" refers to the changing with time of the price for electricity that consumers pay, as distinguished from "static" or flat rate pricing. Dynamic pricing done properly promotes the regulatory principle of cost causation. The more extreme the form of dynamic pricing, the better the alignment of rates to the cost customers impose. There are many options for dynamic pricing reform:

- The most extreme is real time pricing, in which the price changes throughout the day, usually hourly. Larger customers in many states experience real time prices.
- Less extreme is critical peak pricing, which is usually a time of use rate structure with a very high rate that is charged during a small percentage (generally 1%) of the hours in a year (these hours are only known a short time in advance, either the day before or even that day, but with enough time for the customer to avoid usage at the critical peak hours). There are many variants; however, a key element to most is the multiple between the critical peak rate and the average rate, which must be high enough to prompt a customer response.[3] A variant now being piloted offers customers a rebate if their electric use falls below a baseline during peak hours.
- Less extreme still is a time of use price structure with sufficient differential between on-peak and off-peak times to affect customer usage.

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[1] http://www.epa.gov/cleanenergy/energy-programs/napee/resources/action-plan.html (March 15, 2008)
[2] Faruqui, Ahmad (2007) 'Pricing Programs: Time-of-Use and Real Time, Encyclopedia of Energy Engineering and Technology, 1:1, 1175 - 1183
[3] Patty Harper-Slobozowicz of Utilipoint suggests the multiple must be at least three to get the desired peak effects. Some pilots have included a multiple of 5 or 7 or more.

- Further rate design enhancements that promote value and efficiency are: seasonal differential structures can signal the seasons when peak use tends to occur; an inclining block rate can favor low volume users, while charging higher rates for usage above a threshold each month.

Key considerations

Simplicity:

Customers have been found to understand and optimize their usage with rate designs that are somewhat more complex that one rate all the time. Yet, care must be taken to avoid such complexity that the customer loses interest in responding and perhaps gets upset. For example, an inclining block structure that has two, or maybe three usage steps can work, but more steps confound the customer. The notification of the critical peak hours must be clear and with sufficient notice.

Education:

While customers may be prone to inertia concerning their utility rates, education about the change and the new system is important. Education can enable customers to understand more clearly what they can change about their consumption to take the greatest advantage of the new system. Education can also head off a backlash from customers who might object to the change for whatever reason.

What will the default rate be?:

Interested customers can get experience by opting in to dynamic prices. With this approach, most consumers can continue with the rates they are used to. On the other hand, system benefits in the form of peak reductions associated with dynamic pricing will be modest. A more aggressive approach is to use a dynamic price structure, perhaps a critical peak structure, as the default rate. Customers uneasy about service under a critical peak structure may be given the opportunity to opt out to a flat rate.

Research suggests that customers tend to keep the rate they are given. Dynamic pricing advocates point to these results and say that customers will accept dynamic prices, especially if suitable consumer education lays a foundation. Others are not convinced, suggesting that consumers do not want more information to manage about their electric service in the midst of already complex lives.

Supporting and Enabling Hardware and Technology:

Conventional meters accumulate a record of usage over time but there is no distinction indicating when the usage occurred. A conventional meter can be modified with a data recording system such that the usage in a given hour can be recorded and matched after the fact with the price prevailing at the time. Under this approach with a real time price or with a critical peak price, the consumer gets no signal that might affect usage, so a key advantage of these pricing plans is lost under this set up. A conventional meter with hourly usage recording can support a time of use rate, since consumers can know the rate being charged at any given time. If consumers know that rates are high during a July afternoon, they can buy efficient appliances that tend to run at these hours, and develop a habit to curtail use of non-essential appliances and equipment.

Advanced metering infrastructure (AMI) refers to a system that includes meters with one way or two way communications, as well as the data management system and other systems at the load serving entity that make the most of the new meters. This system would support any pricing system, including prices that can change a dozen times in each hour, and has the key attribute of signaling to customers when prices will or will likely change up or down. This system also has the potential to automatically control customer appliances and equipment, adjusting thermostats and light levels, or cycling off pool pumps and refrigeration systems with pre-programmed logic controlled by the customer. Thus, AMI enables demand response programs to be available to anyone with a controllable end use, no matter how small. AMI also enables many beneficial system features, including precise outage detection and diagnosis of the state of the system, instant service connections and disconnections, customized customer baselines to more accurately value efficiency and demand response

An important side note to the topic of advanced metering infrastructure is cost. Conversion comes in two levels. If dynamic pricing and AMI are voluntary (customers opt in), the costs can be modest overall, though they might be high per customer. Importantly, system benefits would be lost since AMI would be scattered somewhat randomly throughout the system. If dynamic pricing and AMI are the default (customers may opt out) or are mandatory, then hardware deployment will be system wide over a period of a few years at cost of perhaps $200-$300 per customer. A few state commissions are in the process of considering utility proposals to deploy AMI system wide and many more are evaluating the results of AMI pilots.

<u>Winners and Losers</u>:

Managing winners and losers is perhaps the hardest aspect of a transition from flat retail rates and is familiar, though uncomfortable ground for utility regulators. Any change in rate design resulting in charging more during peak hours will disfavor those customers who tend to use a lot of electricity at peak hours. Explaining that these customers have been getting the benefit of high cost electricity at average prices does not always work.

An important way through this transition is to remember that these changes should result in lower use at high cost times, more efficient use over all and real dollar savings. The challenge, then, is to enable the “winners” to benefit from system savings, while minimizing the cost impact to the “losers.”

<u>Is there a risk premium in the utility cost of service that serves to manage utility risk of uncertain costs that cannot be passed through to customers due to flat retail rates?</u>:

An additional source of savings is available, though one would not find it explicitly in a utility rate case cost of service, if the utility with flat rates faces the challenge of procuring power in a marketplace relying on commodity fuels and other cost uncertainties, unable to pass unanticipated savings and costs to customers. The utility is managing these risks. If the utility is now able to pass some of the costs of high priced power to customers in the form of higher rates at peak, some of the traditional risk management measures employed by utilities should become unnecessary.

Reasonable expectations:
Rates more aligned with costs will help customers change their behavior. Economists can measure the elasticity of electric consumption. Peak demand will be reduced, especially if dynamic pricing is coupled with aggressive demand response programs, and this will slow the need for new electric capacity.

Some usage will shift from high priced hours to low priced hours, while some usage is eliminated, or made permanently more efficient. This consideration is important if a state is preparing for greenhouse gas mitigation, in which consumption reductions are important. In isolation, dynamic prices have a modest effect on reducing consumption compared with energy efficiency programs. ACEEE suggests the effect of programs compared with prices is 10 to 1. Dynamic pricing coupled with aggressive energy efficiency programs and aggressive demand response programs send the most effective signals to customers about current and future electric markets.

Lessons Learned and Best Practices

- The chapter by Ahmad Faruqui, attached, contains several useful conclusions on lessons learned and best practices in dynamic pricing.

- There is significant experience across the U.S. with dynamic prices for larger customers. There is limited experience outside of recent pilots for mass market customers. States can learn from this experience and bypass pilots, but many state commissions and utilities appear to need to experience a dynamic price pilot before gaining sufficient confidence to make a utility-wide commitment.

- The California utilities are making significant progress in dynamic pricing, in linking them to energy efficiency and in investigating the merits of enabling hardware and technology and offer perhaps the most comprehensive set of experiences for others to evaluate.

- An important action a state can take is to consider eliminating any existing rate design that actively encourages the consumption of energy, such as declining block rates.

- Experience does tell us that a hasty or poorly planned transition can lose the confidence and support of consumers and do long lasting harm to the reputation of dynamic pricing.