Carnegie Mellon Electricity Industry Center

Policy Brief on the Smart Metering, Peak Load Reduction, and Efficiency Provisions of Pennsylvania House Bills 2200 and 2201
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We commend the state legislature for acting to reduce energy consumption and peak electric load through HB 2200 and 2201; customers in Pennsylvania will see several benefits from the provisions for peak load reduction and energy efficiency [1, 2]. The average price for electricity in the market era is greatly increased by high cost "peaker" plants needed during high demand periods. Since all generators asked to supply power during an hour are paid the market clearing price, not needing a high cost generator could lower the price paid to all generations at peak times from around 20 ¢/kWh to around 8 ¢/kWh. Thus, a tiny reduction in peak demand can have a highly leveraged effect on prices [3].

Smart Meters Make Smart Customers

Unless customers know and are charged prices related to wholesale prices, they will not lower peak demand. Smart meters tell customers the real time price (RTP) and allow them to make informed decisions about usage. However, smart meters are sufficiently expensive that requiring that all meters be replaced will not benefit Pennsylvania customers.

Smart meters could have many benefits in addition to reducing peak load, if the meters are selected carefully and implemented with the right technology. We outline here several suggested changes to the advanced metering portions of HB 2200 and 2201 based on our analysis of the issues [3-5].

Not All Customers Need to Have Smart Meters

Considering the cost of smart meters and the likely reaction of customers, those whose savings exceed the cost of the meters are the ones who demand more than 2 kW in peak load (at the time peak system load occurs). Thus smart meters make sense for commercial, industrial, and large residential customers. Although these big customers above 2 kW comprise only 40% of all customers, they represent 80% of total peak load. For the large numbers of smaller customers, replacing their existing meters is more costly than the savings.

In particular, commercial and industrial users have 10% of the meters but 64% of the load. If only 500,000 meters were installed, we estimate the net savings would be $350 million annually.

We recommend that the utilities be directed to focus on installing smart meters for 40% of peak load within 4 years, 80% within 6 years, and the remainder only when the current meters have to be replaced[1]. This change will not only generate the greatest benefits quickly, it will benefit nearly all customers, including the smallest ones, by lowering the cost of generating electricity and so lowering all bills. Universal installation of smart meters would cost Pennsylvania hundreds of millions of dollars with no appreciable gain for 60% of the expenditure.

[1] The draft bills' provisions are for 40% of peak load in 4 years, 75% in 6 years, and 100% in 10 years.

Price Reductions Will be Small in the Near Term

Customers will benefit from time varying rates that are high during peak hours and low during off-peak hours because they will be able to shift electricity use that is not time sensitive to hours when the cost of supply is lower.

Long-Term Benefits from Time Varying Rates will be Large

Compared to a decade ago, customers have been using much more of their electricity at peak hours, requiring massive investments in peaking capacity: 15% of generation capacity is used less than 100 hours each year. While short term price reductions will be very small (1 to 3%) the big benefits from RTP will come from reduced investments in peak generation capacity. Our calculations predict that a change to RTP could bring down peak load by 7%-15% depending on how customers react to price changes. In our judgment, aggressive reductions beyond the 4% of peak load specified in HB 2200 are realistic and achievable.

A Few Customers Will Not Benefit from RTP

A few customers who use an inordinate amount of their power during on-peak, summer hours will pay more if they do not react to the high prices. Other customers, even those without smart meters, will benefit as peak demand is reduced. The PUC and state regulators should expect many customers to oppose RTP because they are shocked at some high prices; these customers need to understand that their bills will decrease, even though peak prices are high. Customers who consume most of their power on peak need to understand that their behavior is imposing large costs on their neighbors.

Price Volatility versus Lower Rates

A move toward RTP will increase the volatility of customers' monthly bills. High summer bills will be even higher; low spring bills will be even lower. Because of this we support the opt-in and opt-out provisions for RTP in HB 2200 and 2201.

Time-of-Use (TOU) Rates Are Not Good Enough

Our analysis has shown that benefits from time of use (TOU) rates will be less than one fourth of the benefits from RTP. Although we support the freedom of electric retailers to offer many types of optional rates including TOU rates, we recommend removing the references in HB 2200 and 2201 to "providing at least one" TOU or RTP rate after smart meters are installed. We recommend that the provision be changed to "providing at least one" RTP tariff given the very large difference in benefits that an RTP rate will provide.

Eliminate Cross-Subsidies by Charging More for Stable, Flat Rates

We suggest that HB 2200 and 2201 strengthen the provisions for eliminating cross subsidies by distinguishing not just by customer class, but also by rate plan. Utilities currently offer levelized monthly payments and could continue to do so in the future, as long as customers are aware of real time prices and the amount they will pay for their power use. No one advocates that customers have to actually pay their bills at the end of each hour. Bills are smoothed over a month or longer. The important part is that customers see the RTP and the costs of their consumption. We suggest adding an explicit provision to the bills stating that customers will pay the true cost of service for using a particular rate plan including allowing retailers to charge more on average for offering flat rates if the true cost of service is higher.

Peak Load Reductions Accounting

The accounting of peak load reductions in HB 2200 is unclear and should be rewritten as a simple reduction in absolute peak load in MW rather than as a reduction in MWh from the top 100 hours. After analyzing the peak load profiles, we have concluded that the bill as written requires almost 9 times as many MWh be reduced from those hours, but does not necessarily guarantee that the absolute peak will come down at all. The absolute peak MW load of electricity drives the need for new peaking capacity; we therefore recommend that the provision be changed to specify a 4% MW or greater reduction in the absolute peak load.

In Summary, we commend the legislature for this proposed legislation. Real time pricing will lower electricity rates through reducing the need for new peaking power generators and new transmission lines. The benefits to Pennsylvania's electricity customers in the current draft would be increased substantially by small changes in the proposed legislation:

1. Almost all electricity customers will benefit from smart meters and real time pricing, both those who switch their use to off-peak periods and those without smart meters who see electricity prices fall. Smart meters should go first to large customers; the smallest customers should get smart meters only when their current meters need to be replaced; 60% of the costs can be saved with only a tiny reduction in benefits.
2. Time of use rates give only a fraction of the benefits from real time pricing, and should not be required.
3. Write the peak load accounting provisions clearly to specify a peak reduction, rather than a reduction in total electricity consumed.

We caution that real time pricing is a radical departure from the way that almost all customers pay for electricity. The legislature needs to inform customers about the reasons for this change and the likely decrease in electricity bills due to drops in peak demand. To contain dissatisfaction, the legislation must allow customers to opt out of real time pricing, although customers must be informed about the extent to which their bills would decline if they reduced their usage during peak times.

References

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