BEFORE THE WASHINGTON STATE

UTILITIES AND TRANSPORTATION COMMISSION

WASHINGTON UTILITIES AND TRANSPORTATION COMMISSION	)	DOCKET NO. UE-120436 DOCKET NO. UG-120437
Complainant,	)	
v.	)	
AVISTA CORPORATION	)	
Respondent.	)	

EXHIBIT NO. ____ (CME-4)
CHARLES M. EBERDT
REPRESENTING THE ENERGY PROJECT

AARP Public Policy Institute

INSIGHT on the Issues

Can Advanced Metering Help Reduce Electricity Costs for Residential Consumers?

Advocates are promoting advanced metering as a way to help utilities meet growing demand for electricity and help consumers manage increasing costs. Yet it is not clear that all consumers would be able to reduce their electric bills using advanced metering systems, and there are concerns that such systems might have adverse impacts on some vulnerable populations. This paper offers key design principles for advanced metering that take into account consumer concerns.

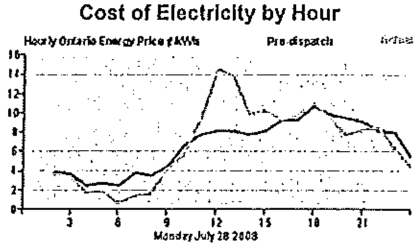
Introduction

As many consumers have seen dramatic increases in their electric bills in recent years, there has been much discussion about how to lower the cost of electricity. At the same time, the continued growth in demand for electricity has placed an increasing strain on electricity generation and transmission facilities and has raised concern about meeting future demand.

Some utility companies have proposed using advanced metering infrastructure (AMI) to help reduce electricity costs for consumers while meeting future increases in demand for electricity. Simply defined, AMI is a system that allows utility companies to charge consumers different prices for electricity on the basis of the time of day the electricity is used.[1] Utility companies that support the use of AMI believe that it will encourage people to shift some of their electricity use away from peak-demand periods. By shifting some electricity use to lower cost, nonpeak hours, many consumers may be able to reduce their electric bills and also reduce stress on the electricity generation and transmission infrastructure.

Currently, the pricing of electricity for most electricity consumers does not reflect the fact that the cost of production varies dramatically throughout the day as electricity demand changes (figure 1).

Figure 1
Cost of Electricity by Hour



Source: Independent Electricity System Operator hourly prices for July 28, 2008.[2] The average weighted price for July 2008 was 6.23¢ per kilowatt-hour.

Most consumers pay a fixed price per unit of electricity used regardless of when consumption occurs. Consequently, they have little incentive to reduce consumption during times when the cost of producing the electricity is higher.

Utility companies seeking to implement AMI believe that they can create a "demand response"[3] among consumers and encourage them to shift a portion of

AARP

Response & Advanced Metering 2007, September 2007, http://www.ferc.gov/legal/staff-reports/09-07-demand-response.pdf.

[2] "Pre-dispatch" represents the projected price at the beginning of the day, while "actual" represents the actual price paid. The graph uses a 24-hour time format on the x-axis where 0 = 12 midnight and 12 = 12 noon. Retrieved July 29, 2008, from http://www.ieso.ca/imoweb/siteShared/demand_price.asp?sid=ic.

[3] FERC defines demand response as "changes in electric usage by end-use customers from their normal consumption patterns in response to changes in the price of electricity over time, or to incentive payments designed to induce lower electricity use at times of high wholesale market prices or when system reliability is jeopardized." *FERC Staff Report*, note 1.

[4] Demand response is fundamentally different from energy efficiency, which involves doing the same activities but using less energy to do them. For example, a consumer can purchase a more energy-efficient air conditioner that will maintain the same room temperature using less energy.

[5] NERC's mission is to improve the reliability and security of the bulk power system in North America. To achieve that, NERC develops and enforces reliability standards; monitors the bulk power system; assesses future adequacy; audits owners, operators, and users for preparedness; and educates and trains industry personnel.

[6] NERC, *NERC 2007 Long-Term Reliability Assessment,* NERC, October 2007.

[7] "Change, Innovation Needed to Ensure Future Reliability Says NERC President & CEO," NERC press release, February 21, 2008.

[8] Public Law 109-58.

[9] Prices can become especially high during certain days of the year when electricity demand peaks. These peaks are typically associated with hot weather and the widespread use of air conditioners.

[10] N. Brockway, *Advanced Metering Infrastructure: What Regulators Need to Know About Its Value to Residential Customers,* National Regulatory Research Institute, February 13, 2008.

[11] Ibid.

[12] Retrieved June 10, 2008, from http://www.oru.com/programsandservices/incentivesandrebates/timeofuse.html.

[13] K. Spees and L. Lave, *Impacts of Responsive Load in PJM: Load Shifting and Real Time Pricing,* Carnegie Mellon Electricity Industry Working Paper, January 31, 2007, http://www.cmu.edu/electricity.

[14] Ibid.

[15] A rolling blackout is a controlled way of rotating available generation capacity among various districts or customers, thus avoiding wide-area total blackouts.

[16] For a detailed discussion of these issues, see B. Alexander, *Smart Meters, Real Time Pricing, and Demand Response Programs: Implications for Low Income Electric Customers* (Revised May 30, 2007), http://www.pulp.tc/Smart_Meter_Paper_B_Alexander_May_30_2007.pdf.

[17] For example, an analysis of the California Statewide Pricing Pilot of 2003–2004 found that high-use customers were able to reduce electricity use significantly more than low-use consumers when electricity prices were raised during critical peak demand times. K. Herter, *Residential Implementation of Critical-Peak Pricing of Electricity*, 2006.

[18] For example, see Rhode Island Department of Health, *Extreme Cold and the Elderly*, retrieved September 5, 2008, from http://www.health.state.ri.us/cold.php, and City of El Paso, Texas, *Extreme Weather Tips*, retrieved September 5, 2008 from http://elpasotexas.gov/weather_task_force/seniors1.asp.

[19] B. Alexander, note 16.

[20] Testimony of Charles Harak, Esq. (National Consumer Law Center Inc.), "Regarding DOE's Appliance Efficiency Standard Program," before the House Committee on Energy and Commerce, May 1, 2007.

[21] C. Palmeri and A. Aston, Electricity Meters Spark a Debate, *BusinessWeek,* August 25, 2008.

[22] B. Alexander, note 16.

[23] Participants in these types of programs typically receive a credit on their electric bill.

[24] N. Brockway, note 10.

[25] For a detailed description, see N. Brockway, note 10.

Types of Time-Based Pricing Plans

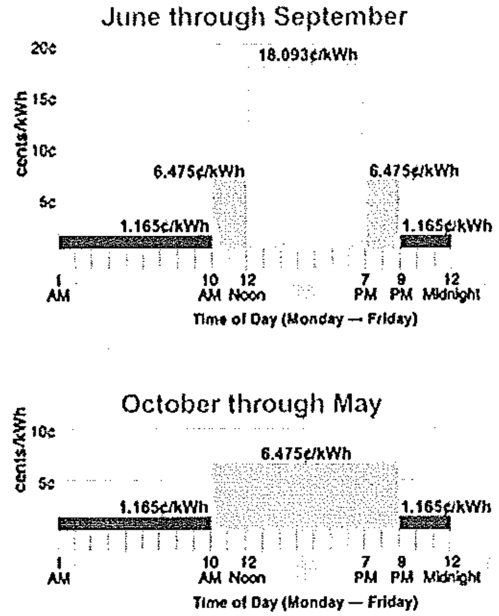
- ✓ Critical peak pricing (CPP)
- ✓ Time of use (TOU)
- ✓ Real-time pricing (RTP)
- ✓ Peak time rebate (PTR)

Critical peak pricing (CPP) involves charging very high prices for electricity during times when electricity demand is extremely high (critical peak demand) and the system is at maximum capacity.[9] These periods typically occur only during about 1 to 2 percent of the hours of the year.[10]

With CPP, high-priced periods will tend to be short, but the prices for electricity during these periods will be high. For example, during a CPP peak demand time, the cost of electricity might be 10 or more times higher than during other times, but nonpeak prices will be correspondingly lower.[11] Typically, the utility will notify consumers, often by e-mail or telephone, the day before or the morning of a critical peak day. Factors that might trigger a critical peak demand time could include very hot temperatures during the summer or lack of power generation capacity caused by equipment failure. The specific features of a CPP program will depend on how the AMI program is structured and would be subject to regulatory approval.

Time of use (TOU) involves establishing a set price for electricity used during specified hours of the day. Rates will also vary by the day of the week (demand is generally much lower on weekends and on holidays) and by season. For example, during the summer, rates are generally much higher between noon and 7 p.m., when demand tends to be greatest due to use of air conditioners, while during the fall, winter, and early spring, prices will be lower during these hours (figure 4).

Figure 4
TOU Pricing Example



Source: Orange & Rockland Web site[12]

TOU systems would have a substantial impact on consumers, as periods of higher prices occur each weekday, last for a long time, and change seasonally. However, one advantage is that consumers will know well in advance what periods will be more expensive and when to shift consumption, if possible.

Real-time pricing (RTP) involves setting hourly rates based on current market conditions. It requires consumers to continually monitor what rates are being charged in real time and adjust their electricity use based on these pricing signals.

Peak time rebate (PTR) offers a rebate to consumers who voluntarily use less electricity during peak times on high-demand days. Consumers who did not reduce used would not have to pay higher prices, but consumers who did reduce their electricity use would receive a credit on their electricity bill.

Potential Benefits of AMI

Potential Benefits of AMI
- ✓ Cost savings for consumers
- ✓ Overall system benefits
- ✓ Better service for customers
- ✓ Reduced need for new power plants and transmission lines

Utility companies have argued that if AMI decreases the use of electricity during high-cost peak periods, consumers will realize substantial savings. For example, one study found that within the Pennsylvania-New Jersey-Maryland regional transmission area, even a small decrease in demand would make a large difference.[13] The study notes that a peak use reduction of just 1.7 percent would be sufficient to realize half of all potential customer savings.[14] Consequently, not all consumers would need to reduce their energy use during peak times for demand reductions to provide substantial cost savings for the system as a whole.

Another potential benefit is that AMI allows for better service for all customers. If peak loads are reduced, fewer blackouts are likely to result from equipment failures caused by system stress during high-demand times. Reducing peak loads would also help to eliminate the number of rolling blackouts[15] caused by inadequate power resources. Customer service would improve because AMI systems allow utility companies to pinpoint the exact location of interruptions and system problems more quickly, resulting in faster restoration of service.

In addition, utility companies have suggested that they will be able to generate substantial operational savings through the use of the automated meter-reading component of an AMI system, instead of sending personnel to read each meter every month. This could potentially reduce the operating fees charged to consumers and help reduce their electric bills. However, these projections do not take into account the considerable upfront cost of installing AMI systems. As a result, utility companies would have to negotiate with regulators to determine how these costs are recovered.

By providing pricing signals, AMI can spur consumer awareness of energy use (as well as the variable cost of electricity depending on time of use) and help encourage conservation. Reduced peak use lessens the need for new power plants and bulk transmission lines, which saves on costs associated with expanding the electricity generation and transmission infrastructure. Such a result would also help reduce friction caused by citizen opposition to the construction of new power plants or additional bulk power transmission lines in their communities.

Potential Concerns about AMI

There are a number of concerns about how AMI systems might impact electricity consumers, especially older and low-income consumers.

Potential Concerns about AMI
- ✓ Bills not lowered for all consumers
- ✓ Vulnerable populations less likely to benefit
- ✓ Negative health impact as some consumers reduce use of electricity during times of extreme weather
- ✓ Cost of implementing AMI will be paid by consumers
- ✓ Not the lowest cost means of reducing demand

One concern is that AMI will increase the electric bills for some groups of consumers who are unable to reduce use during peak times. The concern is that not all consumers will be able to respond to pricing signals, and those who use the least electricity (often low-income consumers) might not be able to shift enough use away from high-cost peak times and could end up with higher electric bills.[16] Higher income consumers, who use more electricity than lower income consumers, might be in a better position to shift use[17] and, as a result, be more likely to realize savings. Higher income consumers would also be better able to pay for the increased costs should they be unable to shift electricity use during peak times.

Thus, if these concerns are realized, the AMI system may create winners and losers. While the overall effect may be to reduce costs in the aggregate, some populations, such as low-income and low-use consumers, may find that their electric bills have increased, while others, such as high-income and high-use consumers, may see cost savings. For this reason, opponents of AMI argue that it is important to know whether any overall savings resulting from the use of these systems come at the expense of a subset of the population.

Another key concern is that consumers who need to avoid temperature extremes for health reasons,[18] such as many older persons, may be forced to change thermostat settings to avoid higher bills and suffer adverse health consequences as a result.[19] Also, low-income consumers are more likely to rely on older, less energy-efficient appliances,[20] which consume more electricity and would be expensive to use during peak demand periods. Such consumers could receive higher electric bills.

The cost of installing AMI systems is another concern. While utility companies can realize operational savings by installing advanced meters, these savings may not cover the costs of installing the AMI systems. As a result, utility companies may ask regulators for authority to recover these costs through surcharges on consumers' electric bills.[21] Such charges might be greater than the amount a consumer could save by participating in an AMI program.[22]

Finally, there are other ways to reduce use at peak times that may have less impact on any particular population. One example is the use of voluntary[23] direct load control devices (DLCs) that can reduce energy use during peak times. Consumers who volunteer for such a program could, for example, use a thermostat with a remote connection to the local utility, which would allow the utility to turn off air conditioners for a specified period (for example, for 20 minutes every four hours) or change thermostat settings a few degrees to reduce energy consumption during peak times. By cycling through the entire pool of units with DLCs, it may be possible to reduce demand sufficiently without compelling any group of consumers to forgo air conditioning for an extended period.[24]

Analysis of AMI Systems

Utility companies have run several small pilot AMI programs to examine how well AMI systems work. Because each AMI system and pilot program was unique, it is difficult to draw definitive conclusions. However, an analysis of these programs by the National Regulatory Research Institute[25] found the following:

- Overall, consumers significantly reduced demand in response to CPP programs. However, individual consumer responses varied widely. Not all participants reduced demand during peak periods, and some increased use during peak periods. This raises the question of whether certain groups are unable to lower their electricity usage during peak times.

- Lower use consumers were able to reduce their demand by a lower percentage than higher use consumers. However, contrary to concerns raised by opponents of AMI, lower use consumers realized the largest cost reduction as a percentage of their overall electric bill.
- Lower income consumers reduced electricity demand by lower percentages than higher income consumers.
- None of the pilot studies could provide definitive information on the likely impact of AMI on overall electric bills, as these studies did not take into account the cost of installing the AMI systems. Questions remain about how utility companies would recover these costs, and how much they might add to consumers' electric bills.

Conclusion and Recommendations

The increasing cost of electricity requires action to help consumers manage their current and future electricity costs. At the same time, growth in electricity demand necessitates measures to meet this increasing demand without overwhelming the electricity generation and transmission infrastructure. Some utility companies have advocated AMI systems as an important step in meeting these two goals.

However, owing to the lack of knowledge about the impact of advanced metering on consumers, it is not clear how many consumers would be able to reduce their electric bills using AMI systems. Further, opponents of AMI have raised a number of concerns about the effects of AMI on some consumers, particularly low-income and elderly consumers. While there are not enough data to fully evaluate these concerns, any proposed AMI system needs to be able to manage these concerns should they arise after the system is implemented.

Consequently, any use of an AMI system should be approached with caution. The following design principles are recommended:

- Before implementing any AMI system, policymakers should evaluate the proposed system to ensure the following:
  - The AMI system is as transparent as possible so that it is clear how the system will work.
  - It is clear how much the system will cost to implement and who will pay these costs.
  - It is known how the system will affect different groups of residential consumers and what the cost and benefits to these different groups will be [see appendix for additional details].
- Utility companies should be required to provide data on the impact of any implemented AMI system to regulators so that regulators can gauge both the financial impact on consumers and how well the system is working to reduce peak demand.
- Any AMI system needs to ensure that vulnerable populations, such as low-income consumers and consumers with health problems, do not suffer adverse consequences should AMI result in substantially higher electric bills for these people.

---

[1] The Federal Energy Regulatory Commission (FERC) defines AMI as a metering system that records customer consumption (and possibly other parameters) hourly or more frequently and provides for daily or more frequent transmittal of measurements over a communication network to a central collection point. The system includes hardware such as advanced meters capable of collecting and communicating electricity use data, software to run the system, communications systems, and customer-associated systems. FERC Staff Report, *Assessment of Demand*

Response & Advanced Metering 2007, September 2007, http://www.ferc.gov/legal/staff-reports/09-07-demand-response.pdf.

[2] "Pre-dispatch" represents the projected price at the beginning of the day, while "actual" represents the actual price paid. The graph uses a 24-hour time format on the x-axis where 0 = 12 midnight and 12 = 12 noon. Retrieved July 29, 2008, from http://www.ieso.ca/imoweb/siteShared/demand_price.asp?sid=ic.

[3] FERC defines demand response as "changes in electric usage by end-use customers from their normal consumption patterns in response to changes in the price of electricity over time, or to incentive payments designed to induce lower electricity use at times of high wholesale market prices or when system reliability is jeopardized." *FERC Staff Report*, note 1.

[4] Demand response is fundamentally different from energy efficiency, which involves doing the same activities but using less energy to do them. For example, a consumer can purchase a more energy-efficient air conditioner that will maintain the same room temperature using less energy.

[5] NERC's mission is to improve the reliability and security of the bulk power system in North America. To achieve that, NERC develops and enforces reliability standards; monitors the bulk power system; assesses future adequacy; audits owners, operators, and users for preparedness; and educates and trains industry personnel.

[6] NERC, *NERC 2007 Long-Term Reliability Assessment,* NERC, October 2007.

[7] "Change, Innovation Needed to Ensure Future Reliability Says NERC President & CEO," NERC press release, February 21, 2008.

[8] Public Law 109-58.

[9] Prices can become especially high during certain days of the year when electricity demand peaks. These peaks are typically associated with hot weather and the widespread use of air conditioners.

[10] N. Brockway, *Advanced Metering Infrastructure: What Regulators Need to Know About Its Value to Residential Customers,* National Regulatory Research Institute, February 13, 2008.

[11] Ibid.

[12] Retrieved June 10, 2008, from http://www.oru.com/programsandservices/incentivesandrebates/timeofuse.html.

[13] K. Spees and L. Lave, *Impacts of Responsive Load in PJM: Load Shifting and Real Time Pricing,* Carnegie Mellon Electricity Industry Working Paper, January 31, 2007, http://www.cmu.edu/electricity.

[14] Ibid.

[15] A rolling blackout is a controlled way of rotating available generation capacity among various districts or customers, thus avoiding wide-area total blackouts.

[16] For a detailed discussion of these issues, see B. Alexander, *Smart Meters, Real Time Pricing, and Demand Response Programs: Implications for Low Income Electric Customers* (Revised May 30, 2007), http://www.pulp.tc/Smart_Meter_Paper_B_Alexander_May_30_2007.pdf.

[17] For example, an analysis of the California Statewide Pricing Pilot of 2003–2004 found that high-use customers were able to reduce electricity use significantly more than low-use consumers when electricity prices were raised during critical peak demand times. K. Herter, *Residential Implementation of Critical-Peak Pricing of Electricity*, 2006.

[18] For example, see Rhode Island Department of Health, *Extreme Cold and the Elderly*, retrieved September 5, 2008, from http://www.health.state.ri.us/cold.php, and City of El Paso, Texas, *Extreme Weather Tips*, retrieved September 5, 2008 from http://elpasotexas.gov/weather_task_force/seniors1.asp.

[19] B. Alexander, note 16.

[20] Testimony of Charles Harak, Esq. (National Consumer Law Center Inc.), "Regarding DOE's Appliance Efficiency Standard Program," before the House Committee on Energy and Commerce, May 1, 2007.

[21] C. Palmeri and A. Aston, Electricity Meters Spark a Debate, *BusinessWeek,* August 25, 2008.

[22] B. Alexander, note 16.

[23] Participants in these types of programs typically receive a credit on their electric bill.

[24] N. Brockway, note 10.

[25] For a detailed description, see N. Brockway, note 10.

Appendix

2008 AARP Public Policy on Advanced Meters and Alternative Rate Structures

Policymakers should disallow any time-of-use metering and billing program that requires mandatory participation, is likely to have an adverse impact on residential customers generally, or shifts costs to those who use less than the average amount of electricity.

Policymakers should ensure that all time-of-use metering and billing programs adopt an opt-in approach (in which customers must indicate that they want to participate), as opposed to an opt-out approach (which automatically includes customers in the program unless they specifically indicate that they do not want to participate).

Policymakers should ensure that any time-of-use metering and billing program is accompanied by a consumer education program that, at a minimum, informs customers of both the costs and benefits associated with the selection of the program, how to determine the impact of the program on the customer's annual electricity usage, and the costs of the customer's annual electricity usage.

Policymakers should ensure that any time-of-use (or prepaid or related rate design) pilot program for residential customers includes and identifies low income customers and measures the program's impact on those customers who do not or cannot take actions to avoid the higher peak time prices.

For states considering installations of advanced or prepaid meters, policymakers should specifically order a thorough analysis of such an effort and conduct contested proceedings to determine all of the following:

- the costs and benefits to 1) lower income customers, 2) customers at different usage levels and 3) residential customers, in general;
- the bill impact resulting from payment for the new meters and communication systems;
- the impact on customer service, privacy, and consumer protection policies and programs that presently exist;
- the implicit costs of alternate metering for consumers who will have to spend time and effort monitoring prices to participate in kilowatt-hour usage tracking programs.

Insight on the Issues 18, November 2008

Written by Neal Walters
AARP Public Policy Institute
601 E Street, NW, Washington, DC 20049
www.aarp.org/ppi
202-434-3910, ppi@aarp.org