

Advanced Metering: Policy-makers Have the Ball

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By Chris King and Dan Delurey

Demand response could help solve some energy problems, but not without state regulators pushing for it.

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FERC Chairman Pat Wood recently testified before Congress that "demand response is a crucial element for efficient grid use, as well as an effective deterrent to the exercise of supplier market power." He noted that "most retail customers see flat, 'after-the-fact' electric prices that give little hint of the underlying cost of energy production; they don't reflect scarcity, as when total demand outstrips supply and purchasers compete for the limited power available, or the higher production costs that occur when more inefficient (and costly) power plants are brought online." He added that demand response, using "smart meters" and real-time and time-of-use rates, would allow consumers to use less electricity when it costs more.

Federal and state regulators, along with legislators, are looking at options to address many energy challenges, and are reaching consensus on the need for demand response-and with it, the need to look at advanced metering policy. Since state regulators are responsible for regulating retail electric service, they have the most important role.

Why Demand Response?

Figure 1 is the proverbial picture worth a thousand words. This chart shows the hourly load duration curve for the PJM Power Pool, covering the Mid-Atlantic area. From 1999 to 2001, the highest 15 percent of load on that system-7,500 megawatts-was used only two percent of the time, or only about 100 hours per year.

The Electric Power Research Institute (EPRI) and others have documented that a small shift in usage from the peak period will lead to significant price decreases, as well as a lower probability of electricity shortages.¹ Accordingly, policymakers are recognizing that the present situation, in which consumers get no price signals and pay the same price no matter when they consume power, does not make sense anymore. The answer, they say, is demand response.

Demand response refers to dynamic pricing, whether time-of-use, real-time or critical-peak-day rates, or dynamic load response (including appliance/equipment load control and other interruptible/curtailment programs). While some of these options historically have been referred to as "load management," the change in terminology signifies that advances in metering, communications, and control technology in recent years have resulted in entirely new capabilities. In particular, time-based rates enable consumers to have more choices and more control over their energy use-and of course, their bill.

Advanced Metering: The Basic Infrastructure for Demand Response

Automatic meter reading (AMR) technology has allowed utilities in recent years to reduce costs. However, while these cost reductions presumably have been passed on to customers as a benefit, there is no other direct benefit to the customer from an AMR deployment. AMR systems vary in their capabilities, but in general, the aim of such systems has been to replace monthly manual meter reading with automation, and nothing else.

In contrast to typical AMR systems, an advanced meter not only automates the meter reading function, but also does much more. Advanced metering is the key to providing consumers with price signals and the ability to manage their usage in response to such information. Advanced metering technology measures and records usage data, at a minimum, in hourly intervals, and provides usage data to both consumers and energy companies at least daily.² With advanced metering, utilities are able to provide customers with price signals and more detailed usage data, which gives customers the ability to manage their usage in response to such information.

Advanced metering also provides utilities with many more capabilities to manage their distribution systems and operations more efficiently and reliably, with features such as outage reporting and restoration verification. Advanced metering encompasses all systems that allow electricity consumers to participate in price-based, time-sensitive demand response programs. The potential benefit from advanced metering and dynamic pricing is significant. McKinsey & Co. estimates that annual savings from dynamic pricing implemented nationwide would be \$10 billion to \$15 billion,³ as shown in Figure 2.

These benefits assume that dynamic pricing is implemented voluntarily; customers who cannot or prefer not to shift load off peak would remain on flat rates.

Puget Sound Energy (PSE) in Washington State provides a highly successful example of these policies at work. PSE's customers all have advanced meters and daily access to their time-differentiated usage and price information. To date, over 300,000 of its customers use voluntary time-of-use rates. These customers have reduced their peak load and lowered their overall energy use—and they are pleased with the program. Indeed, 89 percent of participating customers said they were satisfied or very satisfied, and over 90 percent said they would recommend the program to a friend.⁴

Policy Considerations, Federal and State

In Congress, both the House and the Senate have passed versions of comprehensive energy bills that contain a tax incentive for advanced metering devices, and a new requirement for all federal buildings to have advanced meters. The Senate bill also would allow consumers to ask for, and receive, time-of-use or real-time rates from their utility.

On the federal regulatory side, FERC issued its draft rule on Standard Market Design (SMD) on July 31. Load reduction programs have caught the attention of FERC, and have been included in its proposed SMD. In the notice of proposed rulemaking (NOPR), FERC declared that regional load-serving entities must meet resource adequacy requirements (Generation Adequacy Requirement). The process must entertain all options, including demand response, and not favor one solution over another. The NOPR also noted the need for advanced meters to replace monthly meter reading, where customers see only the "imperfect" price signal of a monthly bill. On the state front, competitive metering is no longer seen as something that states should pursue. In July, the National Association of Regulatory Utility Commissioners (NARUC) issued a

report urging state regulators to re-examine competitive metering based on several factors. Perhaps most importantly, the report highlighted the fact that the costs per meter for ad hoc meter installation are proving to be five or six times the cost of doing a broad, utility-scale deployment.⁵ The report also recommended that state commissions explore how to transition consumers into dynamic pricing. Further, NARUC encouraged states to explore state funding or rate-based funding of advanced meters to roll out the technology faster and more cost-effectively, and to enable consumer participation in demand-response programs. California already is on the move. In June, the California Public Utilities Commission (CPUC) initiated a rulemaking⁶ aimed at developing and implementing a plan to provide customers in the state with the enabling technologies and program options to increase demand response. The CPUC said that:

demand-responsive capabilities are important regardless of the ultimate electricity market structure that emerges in the next few years. A perfectly functioning wholesale and/or retail electricity market is not a precondition for development of demand response. On the contrary, demand-responsive capability can be a tool in mitigating the effects of a dysfunctional market, as well as for controlling costs, even in a completely vertically integrated and regulated market.

The commission believes that customers should have access to the greatest feasible range of price information, metering and communications technologies, and energy management equipment to assist them in demand-response efforts.⁷

In July, working closely with the CPUC, the California Energy Commission initiated a parallel proceeding that will develop state policies on dynamic pricing and beyond-the-meter demand-response technology standards, such as smart thermostats.⁸

States Should Focus on the Mass Market

With the notable exceptions of Puget Sound Energy and Gulf Power (which has a highly successful residential real-time pricing program), the primary focus of demand response has been load reduction programs. These programs include demand bidding and interruptible/curtailable programs, and have been operated by Independent System Operators as wholesale programs or as utility offerings to large industrial customers.

As evidenced by discussion of demand response at the July NARUC meetings, it is wholesale-level, large-customer demand response that is still getting the attention. Yet, the demand response that state regulators can have the most control over, and impact on, is the other type—price-responsive demand response on a mass-market basis. Currently, state regulators are giving far less attention to what they can, or should, do to design time-based rates and to ensure that the advanced metering is deployed.

While wholesale level demand response is a natural starting point, it will not provide the most permanent benefits to the nation's electricity system and industry. For example, its usefulness in meeting the generation adequacy requirement is limited. In contrast, mass-market dynamic pricing can have a much greater long-term effect. Providing residential customers with price signals and choices of time-based rates, especially time-of-use and critical peak-day rates, can lead to a cultural, societal-level shift in how customers think about and use electricity. It can lead to utilities and other service providers having new abilities and opportunities to optimize the planning and operation of their generation and delivery systems. Mass-market dynamic pricing also can lead to savings equal to, or greater than, those of commercial demand-response

programs. The McKinsey study estimated that the majority-53 percent-of savings would come from the residential sector, even though residents consume only 40 percent of total power.

The Need for Cost Recovery Certainty

The gateway to giving customers price signals and providing them with time-based rates is an advanced meter. Thus, state regulators must focus on how to get them deployed. In doing so, they face many barriers and challenges.

A major part of the regulatory bargain for most states that have restructured has been some form of rate cap or freeze. Legislatures saw such caps as a political exchange, a benefit to consumers balanced against the utility side of the ledger that gained the recovery of potentially stranded costs, among other things. What this means, however, is that many utilities are reluctant to make an investment in advanced metering, since they have no ready and available way to recover their costs.

With restructuring still a work in progress, and with competitive metering withering but not officially dead, utilities will continue to be reluctant in their approach to meters unless they can be certain that such costs can be recovered in regulated rates.

Many utilities have moved to AMR based on the business case of cost reductions resulting solely from replacing human meter readers. Advanced metering costs slightly more than AMR, but yields far greater benefits. The dynamic information and communications/operational functionality that utilities get with advanced metering can provide cost savings. They may not be as obvious as eliminating meter reader jobs, but ultimately the savings are much larger.

Misconceptions About Mass Market Demand Response

When given a reasonable choice, residential customers consistently have expressed a desire to volunteer for dynamic pricing and other load-reducing options. This includes millions of customers who have participated in air-conditioner load control, and tried time-of-use prices. For example, in a nationwide survey conducted in 2000, 43 percent of consumers said they were interested in time-of-use prices.⁹ Moreover, residential consumers are more price-responsive than other customer groups, according to the Department of Energy and others. (See *Figure 3*)¹⁰ Yet another misconception, particularly among legislators, is that price signals and time-of-use rates in the residential sector mean that consumers will be forced into the spot market and required to monitor and actively manage their consumption on an hourly basis. This misconception surfaces particularly when real-time pricing is used in general policy discussions as a proxy for the entire range of time-based pricing. The political reaction to this is understandably negative-but active consumer monitoring is not what is being talked about in terms of price-responsive, mass-market programs. Care must be taken to convey the nature of the programs correctly and avoid confusion that could hamper movement forward in this area.

Incentivize Utility Action and Performance

It has been some time since John Rowe, then-CEO of New England Electric System, made his famous statement that "the rat must smell the cheese" if demand-side programs are to be vigorously pursued and optimally run by utilities. Demand-side management now has evolved into demand response, which involves a utility offering new and different rates, and incurring costs for the advanced metering and communications technology needed to implement them. Both utilities and state regulators should look at how utilities might be provided with incentives

(carrots instead of sticks) to help them move forward in this area. Whether advanced metering and dynamic pricing are the chicken or the egg, respectively, state regulators need to move directly to preparing a meal for general customer consumption.

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3. McKinsey & Company, "The Benefits of Demand-Side Management and Dynamic Pricing," May 2001.
4. Penny Gullekson, Puget Sound Energy, reported at California Energy Commission Demand Response Workshop, March 15, 2002.
5. Arthur Andersen, "Cost Impact of Competitive and Network Metering in New York State-Final Report," for New York Department of Public Service, November 1998
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