



Staff Assessment of Demand Response and Advanced Metering

Item No. A-5
July 20, 2006

Good morning, Chairman Kelliher and Commissioners Brownell and Kelly. This presentation summarizes Commission staff's assessment of demand response and advanced metering.

With me at the table are several members of the staff team. Norma McOmer of OEMR, Aileen Roder of OGC, Carol Brotman White of the Office of Enforcement, and Eileen Merrigan, also from the Office of Enforcement. Other staff who contributed to this effort were Michael Goldenberg of OGC, Michael Miller of OED, and our summer intern Claudia Daisley.

EPAAct 2005 1252(e)(3)

- Report for electric industry required within 1 year:
 - **Advanced metering penetration**
 - **Demand response programs**
 - **Resource contribution from programs**
 - **Role of demand response in regional and transmission planning**
 - **Demand response regulatory barriers**

This staff assessment is in response to section 1252(e)(3) of the Energy Policy Act of 2005. EPAAct 2005 directed the Commission to assess several advanced metering and demand response topics. These include:

Advanced metering penetration

Demand response programs

Resource contribution from programs

Role of demand response in regional and transmission planning

Demand response regulatory barriers

Based on this direction, staff examined demand response throughout the United States (including non-jurisdictional areas such as ERCOT, Hawaii and Alaska) in both the retail and wholesale markets, and in private and publicly-owned utilities.

This report will be published by August 7.

Main Conclusions

- **Demand response is important for both wholesale and retail markets**
- **Current DR capability represents between 3% to 7% of peak demand in most regions**
- **Low penetration of enabling technologies**

The primary conclusions we reached in this effort were the following.

Demand response can play a key role in both wholesale and retail markets. In wholesale markets, it can introduce needed price responsiveness when wholesale prices spike, and can help reduce the ability to exercise market power. In retail markets, demand response can assist load serving entities hedge their positions and meet their load obligations at the least cost.

Our research indicates that current demand response capability or potential in most regions is between 3 and 7 percent. One region that is served by the Midwest Reliability Organization NERC region has a higher capability – close to 20 percent.

We also found that the penetration of enabling technologies, such as advanced metering, was small.

Report Preparation Steps

- Commission staff
 - Received comments in AD06-2
 - Held January 25, 2006 conference
 - Conducted demand response and advanced metering survey
 - Reviewed literature
 - Examined regional transmission planning

In order to prepare this report, Commission staff conducted several activities over the last year. A docket AD06-2 was opened to receive comments. A technical conference was held in January, where we heard from 31 panelists and received regional perspectives. We designed and implemented a survey of the level of advanced metering and demand response in the United States. Finally, we reviewed the literature and examined regional transmission planning in depth.

Advanced Metering and Demand Response Survey

- First of its kind
- Covered all 50 states
- Surveyed
 - Public and private utilities
 - Regulated and unregulated entities
- Voluntary survey of 3,365 entities
- Excellent response rate of 55%

I want to briefly describe our survey before I talk about what we found. After reviewing available data sources, staff determined that a comprehensive database on metering did not exist; data at the demand response program level was also missing. We hired UtiliPoint International to conduct a web-based survey.

The survey we implemented is

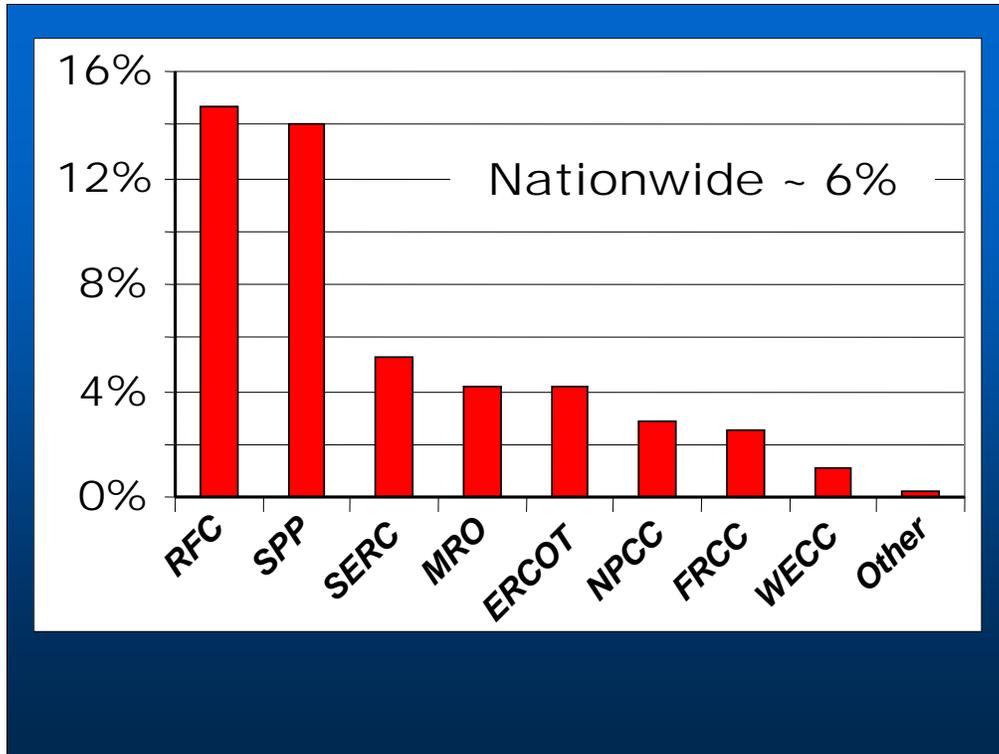
The first of its kind, and will represent a baseline for future deliberations.

We surveyed entities in all 50 states.

We surveyed public and private utilities, and regulated and unregulated entities -- including investor-owned utilities, municipal utilities, rural electric cooperatives, power marketers, state and federal power marketers, ISO/RTOs, and demand response providers.

The voluntary survey went out to 3,365 entities

And we obtained an excellent response rate of 55% for a voluntary survey. Certain groups such as investor-owned utilities had a response rate over 80 percent. We would like to thank EEI and NARUC for coordination assistance in achieving such a high rate amongst the investor-owned utilities.



To answer the question of penetration of advanced metering, staff examined the uses of metering and the available metering and communications technologies. Based on this review, staff chose to define advanced metering as:

A metering system that records customer consumption [and possibly other parameters] hourly or more frequently and that provides for daily or more frequent transmittal of measurements over a communication network to a central collection point.

The key point in this definition is that it includes the full advanced metering system, comprising meters, communications, and data management.

The survey indicates that advanced metering has a nationwide market penetration of 6 percent, and that the penetration rate varies by region. The regions associated with the ReliabilityFirst and SPP NERC regions have the highest penetration, close to 14 percent, while the remaining regions have lower penetration than the national average.

Top Ten States for Advanced Metering Penetration	Pennsylvania	52.5%
	Wisconsin	40.2%
	Connecticut	21.4%
	Kansas	20.0%
	Idaho	16.2%
	Maine	14.3%
	Missouri	13.4%
	Arkansas	12.9%
	Oklahoma	7.2%
	Nebraska	6.8%

To assist future state deliberations on advanced metering, the survey requested data on advanced metering at the state level. The final report will provide estimates of market penetration of advanced meters for all 50 states.

The top 10 states are listed on this slide. Pennsylvania has the highest penetration of advanced metering in the country. What is also interesting about this list of states is that advanced metering is in place throughout the United States, in restructured and non-restructured states, in rural states and in more-urban states. This suggests that advanced metering provides value across a wide variety of utility characteristics and customer types.

I also want to indicate that advanced metering varies by company type. Electric cooperatives show the highest penetration at about 13 percent, followed by investor-owned utilities at close to 6 percent.

Demand Response Time-Based Rates

- **Time-of-use**
- **Critical-peak pricing**
- **Real-time pricing**

Turning to demand response, Commission staff categorizes demand response into two categories: time-based rates and incentive-based demand response. The common features of both types are that they are active customer responses to prices or incentive payments. The changes in electricity use are designed to be short-term, centered on critical hours during a day or year when demand is high or when reserve margins are low.

Time-based rates include 3 rate alternatives:

Time-of-use rates provide customers with a rate schedule that varies by time period, broken into daily peak and off-peak blocks. It is the most prevalent form of time-based rates.

Critical peak pricing is a relatively new variant of time-of-use. The key difference is that a critical peak period is added to the rate blocks, with significantly higher price which is invoked only a few days or hours a year. The timing and setting of the critical peak period is based on system needs or high wholesale prices. Programs at Gulf Power and pilots in California suggest that critical peak pricing can reduce peak demand, with high customer satisfaction.

Real-time pricing exposes customers to hourly prices, typically based on real-time or day-ahead wholesale prices. About 50 entities currently offer real-time pricing, mostly to large (commercial and industrial) customers.

Incentive-Based Programs

- **Direct load control**
- **Interruptible/curtailable rates**
- **Demand bidding/buyback programs**
- **Emergency demand response programs**
- **Capacity-market programs**
- **Ancillary-services-market programs**

There are six types of incentive-based demand response programs. They provide incentives or direct payments to customers to induce curtailments when needed, usually for system reliability.

Direct load control involves remote control of appliances such as thermostats, air conditioners, or water heaters.

Interruptible/curtailable customers receive discounted rates or credits when they curtail their consumption when directed by their load serving entity.

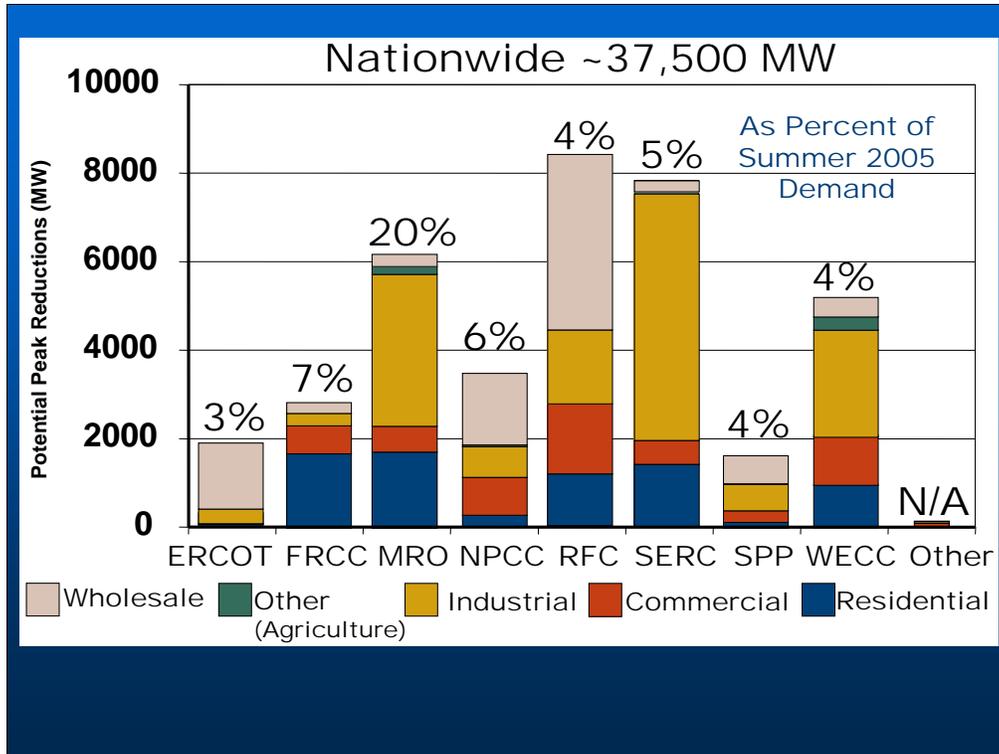
Demand bidding/buyback programs allow customers to bid load reductions into utility or ISO/RTO markets. If their bids are accepted, they are obligated to curtail.

Emergency demand response programs pay customers to curtail when directed, but they do not have any obligation to curtail.

Capacity market programs provide capacity payments to customers for their agreement to curtail when directed.

In ancillary services market programs, fast-responding load reductions can provide spinning, non-spinning, and regulation services.

Note that emergency demand response programs and capacity market programs were invoked in NYISO and California during the heat wave this week.



The results of the FERC survey suggest that about 37,500 MW of demand response potential currently exists. The vast majority of the demand response reported in the survey is from incentive-based demand response.

The regions with the highest MW totals are ReliabilityFirst and SERC. The regions with the highest capability as a portion of their peak load are the Midwest Reliability Organization and the Florida Reliability Coordinating Council.

This chart shows that the source of the capability varies by region. Regions such as the Midwest Reliability Organization, SERC, and WECC have large industrial demand response capability. Other regions such as Florida have high residential demand response capability. ReliabilityFirst and ERCOT have high wholesale demand response levels because of ISO-sponsored demand response programs.

Additional Report Contents

- Proposed Steps to Include Demand Response in Transmission Planning and Operations
- Regulatory Barriers

The report will also cover two additional items. The first responds to the Congressional request for the Commission to identify steps taken to ensure that in regional transmission planning and operations, demand resources are provided equitable treatment as quantifiable, reliable resources.

The second item is a discussion of regulatory barriers to greater demand response.

Before I finish, I wanted to thank several organizations that were very helpful in the implementation of our survey and in the collection of information. In particular, we are very appreciative of the help provided by Patti Harper-Slaboszewicz, Chuck Goldman at Lawrence Berkeley Labs, and Brendan Kirby at Oak Ridge Labs. We would also like to thank NARUC, EEI, APPA, the National Rural Electric Cooperative Association, the National Council on Electricity Policy, the Demand Response and Advanced Metering Coalition, MADRI, and representatives from the various ISO/RTOs for their assistance during the project.