



A National Assessment of Demand Response Potential

June 18, 2009

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Mr. Chairman, Commissioners, good morning.

When we say “demand response” we mean the short-term adjustment of energy use by consumers in response to price changes or incentives. As you know, the Energy Independence and Security Act of 2007 required the Commission to perform this assessment, which will be posted on the FERC website today. We will also post the spreadsheet model on which this analysis is based, and a user’s guide to the model. We hope that others with an interest in demand response will use the spreadsheet to examine the details behind this analysis, and also to perform their own estimates using the data and assumptions they choose.

Purpose and Content of the Assessment

- Staff report to Congress, as required by law (EISA '07), on
 - Demand response potential
 - Barriers to demand response
 - Recommendations

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The Energy Independent and Security Act of 2007 requires the Commission to conduct a National Assessment of Demand Response Potential and report the result to Congress on

- the estimated nationwide demand response potential in 5 and 10 year horizons
- barriers to demand response programs, and
- recommendations for overcoming barriers to more use of demand response.

Unique Features

- Bottom-up, state-by-state analysis
- 15 pilot programs synthesized
- User-friendly spreadsheet model
- Review of barriers
- Recommendations

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The Assessment is the first national analysis of demand response done on a state-by-state basis. Other national studies have been done at a high level so they haven't captured regional differences such as the amount of central air conditioning. In the past, bottom-up studies were local and used varying techniques, which made it hard to compare them.

To begin the analysis, 15 demand response programs piloted by utilities across the country were examined to understand how customers respond to changing prices, and how their responses vary with climate, customer type, the type of demand response program, and other factors. These relationships were then applied to the various types of customers and their use of electric appliances to make unique estimates for every state and the District of Columbia.

The data and calculations behind the Assessment are contained in a spreadsheet model. This serves to create a more transparent analysis and allows easy updating. More importantly, anyone can use the spreadsheet to change assumptions and data—to do “what-if” analyses—and look behind the results to the underlying logic and numbers. As I mentioned, the spreadsheet and a user's guide will be posted on the FERC website.

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The Assessment also contains an extensive list of the barriers to fuller implementation of demand response, based on a review of the literature and the expertise of the contractors and our staff.

Finally, the Assessment makes a number of recommendations for overcoming the barriers and realizing the potential demand response that is estimated in the analysis.

Scenarios

- Business-as-Usual (baseline)
- Expanded Business-as-Usual
- Achievable Participation
- Full Participation

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The study looks at four scenarios to cover a wide range of possibilities. The Business-as-Usual scenario simply reflects today's demand response, with modest growth over the ten-year horizon.

The Expanded Business-as-Usual scenario takes today's mix of demand response programs, extends them geographically into all the states, and raises the participation levels. It tries to capture the potential of aggressively expanding today's programs.

The next two scenarios rely much more on dynamic pricing programs, such as critical peak pricing or real-time pricing, to trigger demand response. By "dynamic pricing", we mean that prices are not known with certainty ahead of time, or known prices that occur on days that are not known ahead of time.

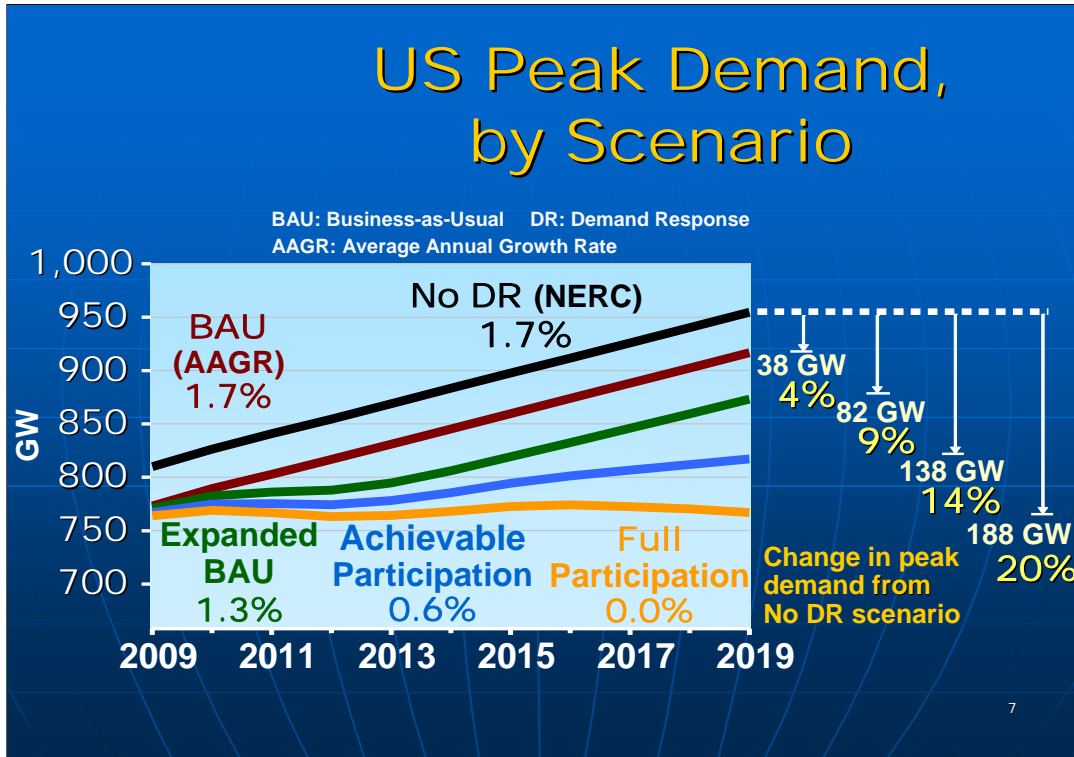
These two scenarios also assume that advanced metering infrastructure (AMI) is installed everywhere by the year 2019, and that many customers use enabling technology, like programmable communicating thermostats, that automatically manage demand as prices change.

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There are two main distinctions between the Achievable Participation and Full Participation scenarios. The first is how the dynamic pricing tariff is treated. In Achievable Participation, dynamic pricing is considered to be an “opt-out” tariff with somewhere between 60% and 75% of customers participating; in Full Participation the dynamic pricing tariff is considered mandatory, with 100% participation.

The second distinction is that enabling technology is used by about 60% of eligible customers in the Achievable Participation scenario, and by all eligible customers in the Full Participation scenario. These two scenarios provide the most optimistic estimates of demand response potential, as we’ll see in the next slide.

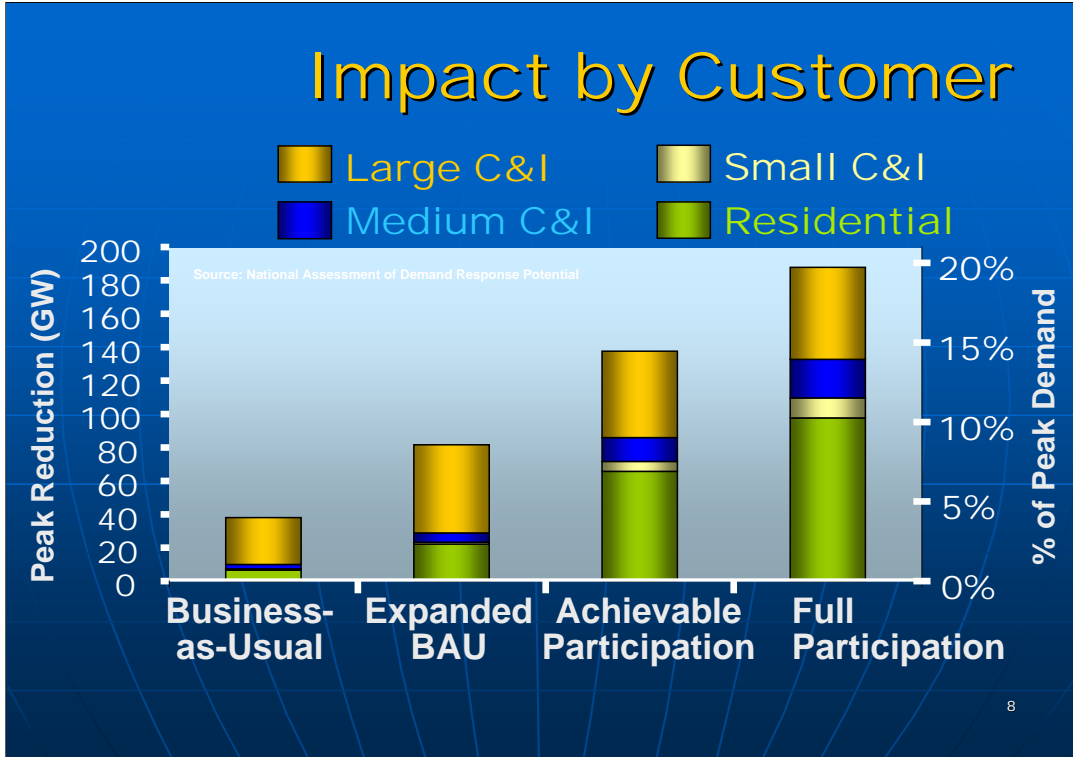


This graphic shows peak summer demand in the U.S. with and without the estimated potential demand response. The black line at the top is NERC’s projected peak demand with no demand response. The colored lines show how the study scenarios would affect peak demand.

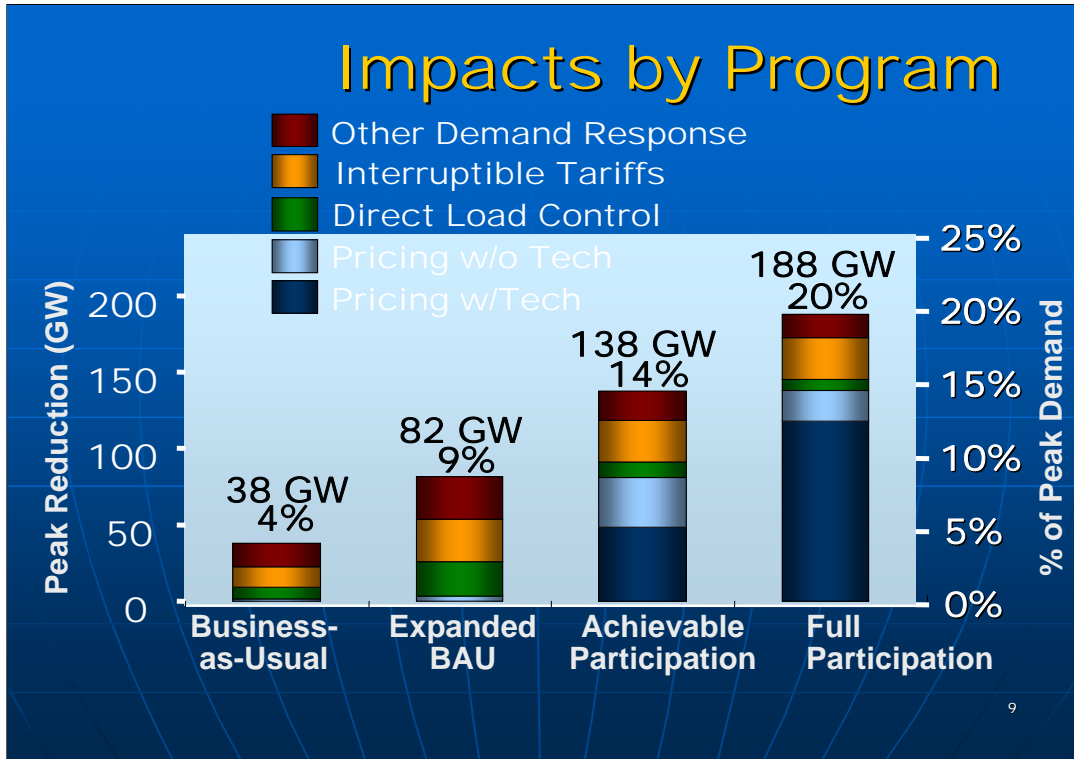
The red line is Business-as-Usual: today’s demand response of about 37 GW, growing over time at the same rate as the NERC forecast. So it is nearly parallel to the No Demand Response line and estimates 38 GW of peak load reduction in the year 2019.

The green line is the expanded Business-as-Usual scenario, which spreads today’s mix of programs to all states and raises their participation levels. It estimates 82 GW of demand response potential in 2019.

The blue line shows the Achievable Scenario estimate, with the majority of customers using dynamic pricing and enabling technology. It leads to an estimated 138 GW of potential in 2019. And the yellow line, the Full Participation scenario with almost all customers on dynamic pricing and enabling technology, estimates 188 GW of demand response potential by 2019. This potential is 20% of the national peak demand.



I'd like to show the same estimates in two other ways. Here you see the demand response potential broken down by customer type. The green portions are residential customers, and you can see that they provide much of the potential in the Achievable Participation and Full Participation scenarios. By contrast, today's programs, shown at the left in the Business-as-Usual column, are dominated by Large Commercial and Industrial customers.



In this slide, the estimated demand response potential is shown by type of demand response program. Business-as-Usual and Expanded Business-as-Usual are almost entirely the traditional interruptible direct load control programs, along with what’s called in the study “Other DR” which includes capacity and demand programs offered by RTOs and third-party aggregators. These tend to be concentrated in Medium and Large Commercial and Industrial customers, which is consistent with the previous observation that most of the demand response potential in these two scenarios is from commercial and industrial customers.

The Achievable Participation and Full Participation scenarios have significant dynamic pricing potential: the light and dark blue portions show potential demand response in programs without and with enabling technology. It is clear that the automated response of enabling technology can significantly increase the potential peak demand reduction from customers responding to dynamic pricing.

Range of State Results

- 13.2 Gigawatts to 0.01 GW
- 25.6% of peak load to 4.6%
- Complete profile for each state appears in the Assessment

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I'd like to show some of the variation in the state-by-state results. On an absolute basis, the demand response potential estimated in the Assessment ranges from 13.2 gigawatts to 0.01 gigawatts. Much of this variation is the result of differences in peak demand between states.

As a percent of each state's peak load, the estimated demand response potential varies from almost 26 percent to less than 5 percent. There are several factors contributing to this variation, including the amount of existing demand response, the estimated price elasticities for each state, and in a few cases the failure of enabling technologies to pass the cost-effectiveness screen in the analysis.

I hope this gives some idea of the diversity of results in the report, which contains a full profile of estimates for each of the fifty states and the District of Columbia.

Barriers

- Disconnect between wholesale and retail prices
- Measurement and verification challenges
- Lack of advanced metering
- Lack of interoperability and open standards
- Lack of customer awareness

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The Assessment discusses a number of barriers to achieving the demand response potential identified. They include the lack of a direct connection between wholesale and retail prices, the difficulties in measuring and verifying the performance of demand response providers, the lack of widespread advanced metering infrastructure and of interoperability and open standards, and a lack of customer awareness and education about the benefits of demand response.

Recommendations

- Educate customers about demand response, AMI, dynamic pricing
- Share program information with utilities, state and local regulators
- Coordinate programs at wholesale and retail levels
- Develop standards for measurement and verification at wholesale and retail

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Finally, the Assessment makes recommendations to overcome the barriers to demand response and help realize the demand response potential it identifies. Some of the recommendations are to:

- educate customers about demand response, advanced metering, and dynamic pricing
- share information about demand response programs with utilities and state and local regulators
- coordinate demand response programs at the wholesale level with programs at the retail level
- develop standards for measurement and verification of demand response at the wholesale and retail levels



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This concludes our presentation, we'd be happy to answer any questions.