

## **Demand Response Programs: Evaluators to the Rescue**

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### **ABSTRACT**

A challenge in many states, including New York, is guaranteeing an adequate supply of safe dependable electricity, especially during periods of peak demand. New York has responded to this challenge with a portfolio of initiatives to facilitate demand reduction as a means of maintaining the reliability of the electric system. These initiatives have functioned well, preventing significant disruptions in the power supply during the eight electricity emergencies called by the New York State Independent System Operator (NYISO) in 2001 and 2002. Evaluation is an important element of these programs, not only for its traditional function of quantifying customer satisfaction levels and determining cost/benefit ratios, but also in gaining insights into consumer behavior. Understanding consumer behavior is critical in helping to guarantee that demand response programs are capable of maintaining or increasing participation and performance levels to keep pace with projections of rising electricity demand. This paper focuses on describing the different types of demand response programs offered in New York over the last three years and then highlights the results of evaluations of the programs and the role that enabling technologies played in program participants' abilities to perform. This includes a summary of key results of the evaluation and the key insights gained on how to deal with real world evaluation challenges, including those related to survey design, response rates and customer segmentation.

### **Background**

New York State has not been immune to the problems caused by increased electricity demand over the last two decades. Between 1980 and 2000, peak demand has grown over five times faster than the state's population and more than double the rate of employment growth (Business Council of NYS, 2003). The most recent analysis by the New York Independent System Operator (NYISO) indicates that despite the recent economic downturn and the loss of the World Trade Center, New York State will require an additional 7,100 MW of generation by 2005 to ensure a reliable and affordable supply of electricity (NYISO, 2002). Over the past three years, maintaining adequate electricity supplies during periods of peak demand has become an increasing challenge, especially in the downstate region of New York. In February 2003, William Museler, NYISO President and CEO, commented that New York's electric demand continues to rise and shows little sign of abating. "Unless significant generating capacity is added to the system—and soon—demand is going to overwhelm supply and reliability will be at risk" (NYISO, 2003).

As part of a more immediate response to potential electricity shortfalls, New York established a comprehensive portfolio of energy efficiency and demand response programs designed for all electricity consumers. Most of New York's demand response programs were designed to pay participants to reduce demand in response to emergency conditions or market price signals. Some programs were designed to encourage a voluntary response, largely through the use of public appeals in the media.

The concepts used to motivate customers to reduce demand are not new. Real-time pricing (RTP) and demand reduction programs were often components of demand side management (DSM) in

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<sup>1</sup> Any opinions expressed, explicitly or implicitly, are those of the authors and do not necessarily represent those of the New York State Department of Public Service.

the eighties and early nineties. For example, Niagara Mohawk in April 1987 introduced RTP programs which became the industry standard. Most utilities introduced time-of-use (TOU) programs in the early 1990's. However, as funding for utility DSM programs declined in the mid-nineties, interest in demand reduction programs also waned. In the twenty-first century, however, demand response programs are once again an important tool in New York's efforts to guarantee safe, reliable and fairly priced electricity for all New Yorkers.

The recent changes in the regulatory structure in New York have made the development of the new generation of demand response programs more complicated compared to those that emerged in the 1980s. Virtually all of New York's electricity consumers now have the opportunity to choose their electric suppliers. Suppliers other than a traditional utility are currently serving over 22% of the load in New York State (34% of the non-residential load).<sup>2</sup> Moreover, the state's investor-owned utilities have divested, or are in the process of divesting, most of their generation. These changes resulted in new challenges to developing a focused response to potential electricity supply shortfalls because of the diverse set of suppliers and marketers in New York. In other words, the PSC could order the utilities to implement demand response programs, but this action would not necessarily impact all the State's electricity customers.

In November 1999, the New York Independent System Operator was formed to administer the electricity markets in New York State and, from its inception, NYISO wanted to involve retail electricity consumers with New York's electricity markets. In September 2000, NYISO established the Price-Responsive Load Working Group, a consortium of interested parties including, the New York State Energy Research and Development Authority (NYSERDA), the Public Service Commission (PSC), environmental groups, representatives of technology firms, regulated utilities and unregulated generators and electric marketers. This group was charged with developing a portfolio of programs that would allow end-use resources to participate in wholesale markets by offering their load reductions as supply, which it refers to as Price Responsive Load (PRL) programs.

In December 2000, the PSC ordered that the regulated utilities identify demand response goals for a three-year period and the programs the utilities intended to implement to meet these goals (Case 00-E-2054). The PSC concluded that the utilities "still have a vital role in addressing the State's short-term load and capacity challenges, particularly with respect to demand side measures." This action, however, only addressed a portion of today's competitive electricity marketplace.

To encourage participation in demand response programs from consumers not purchasing power from their utility and a diverse segment of the electricity marketplace (e.g., electric marketers, aggregators), NYISO introduced a new type of service provider. The Curtailment Service Provider (CSP) was created to represent the demand response load reduction commitments of end-users in New York's wholesale market, and to act as a demand response agent, administering program registration, event notification and distribution of settlement transactions between the end-users and NYISO. NYISO requires any entity interested in subscribing demand response participants to register as a CSP, including investor-owned utilities. However, a CSP is not required to provide either commodity or wires services to its customers.

## **New York's Demand Response Programs-An Overview**

Programs developed in response to the immediate supply concerns fall into three general categories: reliability, economic, and energy efficiency.

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<sup>2</sup> New York State electric migration statistics can be found at the PSC's web page -- [www.dps.state.ny.us](http://www.dps.state.ny.us) --the migration statistics cited in this report reflect activity through March 2003.

## Reliability Programs

Under reliability programs, participants receive compensation for load reductions undertaken at the NYISO's request, which generally is when demand is high and reserves are expected to be deficient. Load is either shifted or reduced through load management practices or through the operation of back-up and emergency generators. There are several programs that fall under this category that are administered either by the NYISO or by a utility. The program portfolio includes:

- Installed Capacity -- Special Case Resource (ICAP-SCR) program -- is a capacity program that pays electricity customers to provide load reduction capability for a specified contract period. This reliability program is called when system reserve shortfalls are anticipated. In 2001 and 2002, ICAP-SCR resources were called during the same emergency conditions as the Emergency Demand Response Program (see below). Participants in ICAP-SCR sell a "call option" for a specified amount of load curtailment at auction. When the program is invoked, participants are expected to provide the contracted capacity. Penalties are assessed for failure to meet the subscribed KW level.
- The Emergency Demand Response Program (EDRP) -- is a NYISO-sponsored short notice program relying on the ability of some customers to voluntarily reduce their demand for a short period of time in exchange for payment. The incentive payment equals the higher of the hourly location based marginal price (LMBP) or \$500 for each MW of load curtailed during declared emergencies. Participation is voluntary and there are no penalties if participants fail to respond. Since the inception of this program, it has had a significant impact. In 2002, EDRP provided, on average, about 650 MW of performance during the periods of greatest need. The MW registered for EDRP grew from 712 MW in 2001 to nearly 1481 MW in 2002.
- Utility-specific initiatives -- Con Edison and Long Island Power Authority (LIPA) offer programs similar to EDRP, but they are designed to be called to address specific locational supply and distribution network related problems in their service territory.<sup>3</sup> The utility can declare a curtailment event at the local level even if the NYISO does not order a statewide curtailment.
- Direct load control -- Con Edison and Long Island Power Authority are operating programs targeted at small users, including residential customers. Both Con Edison and LIPA offer programs based on installing programmable thermostats that they can control during times of peak demand to reduce energy used by central air conditioner systems. For example, in early 2003, the installations in the Con Edison territory represented approximately 7.2 MW of net peak load reductions.

Figure 1. NYISO Demand Response Program Summary

<b>New York: Summer 2002 Experience</b>				
	Participants/ MW	Events	Load Curtailed	Payments
<b>EDRP 2002</b>	1711 1481 MW	22 hr Downstate 10 hr Upstate	~668 MW 34% of CBL (summer)	\$3.3 mil
<b>2001</b>	<b>292/712</b>	<b>23/17</b>	<b>425/38%</b>	<b>\$4.2</b>
<b>DADRP 2002</b>	24	1486 MWH scheduled	~14 MW (average)	\$0.1
<b>2001</b>	16	2694	8	\$0.2

<sup>3</sup> Long Island Power Authority (LIPA) is a government entity that provides power for the approximately 2.8 million residents of Long Island. They are not regulated by the PSC, but have established their demand response effort including participation in the NYISO programs, an aggressive energy conservation program, new generation facilities and the construction of state-of-the-art high voltage line that will allow as much as 330 MW of additional power to be imported from Connecticut to Long Island.

## **Economic Programs**

- The Day-ahead Demand Response Program (DADRP) -- is a customer-initiated economic bidding program, whereby participants offer their load reduction into the wholesale market a day in advance, at a price they determine. These curtailment bids are compared with generation offers to supply, and scheduled when they are lower in cost, thereby moderating market prices during periods of supply shortage. Participants that fail to provide the curtailment amount scheduled are subject to pay the higher of the day-ahead or the real-time price for the shortfall. Since inception, subscription to this program has only been offered by load-serving entities and participation has been limited, resulting in 20-25 MW of load curtailment in 2002. In 2003, CSPs will also be able to subscribe end-users to this program.
- Real time pricing -- three utilities: Central Hudson, New York State Electric Gas and Niagara Mohawk, have customers participating in real time pricing programs. These programs are different in structure from DADRP, and vastly different in participation across utilities. At present, the effectiveness of these RTP programs in mitigating supply shortages and high prices is not known.

## **Energy Efficiency Programs**

A third major element of the demand response effort involves New York's public benefits program. Today the primary source of funding for energy efficiency and other related energy programs is the New York State Energy Research Development Authority's (NYSERDA) "Energy Smart" programs, funded through revenue collected from the System Benefits Charge initiated by the PSC in January 1998. The initial goals of this effort were to promote competitive markets for energy efficiency services, provide direct benefits to electricity ratepayers and be of clear economic or environmental benefit to the people of New York (Case 94-E-0952, 1998).

About \$175 million of the \$234 million total was made available to NYSEDA for this purpose over a three-year period (1998-2001). The remaining funds were allocated to the utilities to pay for previous obligations in the areas of low-income, research and development and DSM programs. A portfolio of programs was developed to improve the State's energy efficiency, reduce the energy burden on low-income energy consumers, support research and development in energy efficiency, encourage renewable energy technologies, and promote environmental monitoring and protection. NYSEDA estimates an annual peak demand reduction of 500 MW for measures installed through December 31, 2002 (NYSEDA, 2003).

In January 2001, the PSC extended the SBC program for an additional five years and increased the annual funding to \$150 million through June 30, 2006, of which NYSEDA administers about \$139 million annually. A key factor in the PSC's decision to increase SBC funding was the recognition of the potential shortfall in the electricity supply during periods of peak demand (Case 94-E-0952, 2001).

The PSC directed NYSEDA to place increased emphasis on load management and energy resource programs. This effort will be a high priority until sufficient generation capacity becomes available. NYSEDA is placing increased focus on energy efficiency measures that reduce consumption during periods of peak demand (e.g., air conditioners), dispatchable emergency generator initiatives, and short-duration load containment measures. In addition, NYSEDA is providing funding for metering equipment necessary to participate in the demand response programs offered by the New York State Independent System Operator: EDRP and DADRP. Moreover, NYSEDA, along with PSC Staff and the utilities, play a critical role in promoting these various programs.

## Evaluation Objectives for New York Demand Response Programs

Given the nascent nature of demand response programs integrated into wholesale electricity markets, a critical ingredient in the successful design and administration of the demand response program portfolio is evaluation. From the outset, policy makers had a strong interest in evaluation of New York's demand response programs because program shortcomings had the potential to contribute to serious safety and economic consequences resulting from power shortfalls. The list of frequently asked and critical questions included:

How can customer participation be increased?

- How can we maintain participation in these programs?
- What levels of demand response can we expect from participants?
- How can we maintain or increase demand response?
- What program changes could jeopardize or promote program participation?
- Are we effectively communicating the message about the critical nature of these programs?

The evaluation project was specifically designed to collect and analyze information useful in answering these questions. Accomplishing this objective required overcoming several challenges:

- Multiple stakeholders – NYISO was interested in feedback on participants' attitudes toward the demand response programs and barriers to participation, as well as to quantify market price impacts. NYSERDA, as a research and development agency, wanted to understand how public benefit funds could be best applied to enable participation and whether those public benefit funds did, in fact, improve performance of participants who received incentives for enabling technologies. The PSC and utilities were not only concerned with performance, but also with participant satisfaction.
- Complex customer ownership issues – While NYISO sponsored the demand response programs, NYISO and participants interfaced with CSPs for program administration functions including notifying CSPs of emergency events and issuing payments to CSPs for their participants' performance. CSPs contacted participants for registration, notification and distribution of payments. Since CSPs are not required to provide commodity or wires services to demand response program participants, a participant could have multiple relationships for electricity service.
- Program revisions, project funding and implementation lead times – In order to make program revisions that may impact tariff changes and to allow adequate time for project funding notices and public benefit program implementation, the evaluation had to be conducted in a very short time frame (less than 6 months). Survey administration took priority to try to capture attitudes about participation shortly after the summer period ended in October. Final results were required between Thanksgiving and years' end to allow for any modifications to program provisions or public funds programs to be made in the beginning of the year for the next summer's season.

In 2001, a committee including representatives of the utilities, PSC staff, NYSERDA, and other market representatives defined the study's objectives and developed a survey instrument. To coordinate the diverse and individual interests of the group, the steering committee developed an issues list that identified the key objectives of the satisfaction survey. The issues list and the final survey were reviewed and approved by the steering committee.

As part of this effort in 2001, the Department of Energy funded Lawrence Berkeley National Laboratory (LBNL) and Pacific Northwest National Laboratory (PNNL) to conduct a study on the role of enabling technologies in promoting customers' demand response. LBNL and PNNL conducted in-depth interviews with 15 participants that had received funding from NYSERDA for technologies to facilitate participation in demand response. In 2002, the evaluation project was augmented by significant professional resources provided by the Consortium for Electric Reliability Technology Solutions (CERTS), including researchers from Lawrence Berkeley National Laboratory and Pacific Northwest National Laboratory, with U.S. Department of Energy (DOE) funding. The CERTS team collaborated with Neenan Associates on the entire demand response evaluation project in New York, from survey design and administration of a targeted in-depth survey to analysis and preparation of the final report (Neenan et al. 2003).

In March 2002, the PSC required that utilities provide monthly demand response program status reports to "facilitate the collection of accurate and timely demand response program data in a consistent format and on a predictable schedule" (Case 00-E-2054, 2002). The PSC also suggested the report would serve as an evaluation tool noting that the report will be used "to benchmark performance against goals, identify program strengths and weaknesses, and analyze program performance under various conditions" (Case 00-E-2054, 2002).

## **Survey Objectives**

Enhancing the role of price responsiveness in increasing electricity reliability and in mitigating price spikes requires understanding the determinants of participation and performance in price responsive load (PRL) programs. To achieve this understanding, the evaluation project conducted interviews with two targeted groups of C&I customers: demand response program participants, and customers who knew about the programs, but elected not to participate (see Figure 2). From the first group, information on customer characteristics and objectives that influenced both the choices of which programs to participate in, and the levels of and methods for actual performance in those programs was gathered. From the second group, information on the roles of customer characteristics and demand response program features as barriers to participation, including the possibilities of changing program features to stimulate participation was collected.

## **Specifics of Survey Design**

A two-part survey was administered in each year's evaluation to identify and quantify the impact of key drivers to program participation and to assess technology installed to facilitate demand response. Part 1, the Customer Acceptance Survey, included questions on end user characteristics (firmographics), possible response strategies, the value of information about the programs, and factors influencing their decision to participate or not. In 2002, select questions from the 2001 survey were repeated in order to facilitate analysis of time trends among program participants. Part 2, a conjoint survey, tested customers' attitudes toward various sets of possible program features to establish which features customers prefer. The results of the conjoint survey were used to assist in identifying what changes to demand response programs might increase or decrease participation.

The Customer Acceptance Survey was further divided into two types: a general survey and a Price-Responsive Load (PRL) Audit. The PRL Audit survey included all the questions of the general survey along with specific questions about equipment inventories and specifications, the purchase and use of enabling technologies and operational activities related to demand response. The purpose of the PRL Audit survey was to allow for in-depth discussion between participants and engineers familiar with

facilities management to obtain detailed information about the types of technologies and strategies that they used to participate and perform in the demand response programs.

## Population Frame and Segmentation

Typical segmentation based on simple customer characteristics did not apply to these evaluations. While characteristics about size or class were important for classification of participants, segmentation was done by program participation. Since customers were able to participate in more than one program, participants had to be further classified by which programs they elected to participate. The focus was on learning what participants found attractive about the programs, what actions they took to respond to an event, whether participation was influenced by public benefit funds and whether enough information was available to help them decide whether or not to participate. For end-users who were informed about the programs, but chose not to participate, called “informed non-participants,” survey questions were intended to identify the reasons.

In 2001, the contact lists provided by utilities included customers who attended a utility-sponsored informational briefing and those contacted by utility account representatives. The lists proved to be too broadly defined and, as a result, yielded very low response rates. In 2002, an alternative approach was used to identify informed non-participants. NYSERDA and the PSC conducted workshops across the state to inform customers about the demand response programs and relevant publicly funded programs to support participation. The list of attendees from the 2002 workshops was used as the source of informed non-participants for the 2002 surveys.

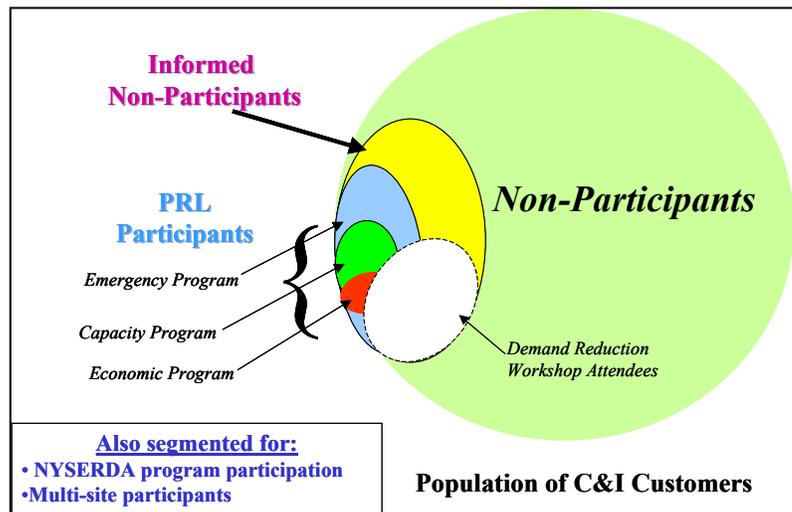
The first year, the utilities were directed by the PSC to participate in the evaluation of the demand response programs and they were the sole source

of the population included in the survey. While the aggregators were asked to cooperate by providing customer contact information for the survey, almost none chose to do so; thereby excluding almost 50% of the participants out of the first year’s survey. In 2002, aggregators were required to make their customer lists available for the evaluation project to rectify that bias.

Participants and informed non-participants also subscribed to enabling technology and peak load reduction programs that were designed to support participation in New York’s demand response programs. While one public benefit program required participation in a demand response program, the other did not. Survey respondents were further segmented by participation in these NYSERDA demand response programs.

Customer segmentation and survey administration in 2002 presented another challenge: the multi-site participant. Multi-site participants are participants whose energy management operations are managed by a single contact for the entity, such as a school district with a single point of contact for energy-related matters, or a facility manager of multiple commercial buildings. While fewer than 10 of these entities enrolled in the demand response programs for 2001, approximately 25% of the EDRP participants in 2002 were multi-site participants (432 in EDRP and 5 in DADRP, representing 89

**Figure 2. Survey Population Frame and Segmentation**



entities). For administration to multi-site participants, one survey was issued to the multi-site entity, not each site.

### Survey Administration

Paper surveys were administered in 2001, with the option of completing the survey via the Internet. Two booklets were prepared, one for the customer acceptance, or satisfaction, survey and one for the conjoint survey. All materials were customized based on the respondent’s program segmentation and coded to track survey responses. Respondents were also provided with the web address and instructed to use the code as their identifier, if they chose to respond in that way. To encourage response, entry into a drawing for incentives of personal value were offered – one for completion of the satisfaction survey and a higher value prize for completion of both the satisfaction and conjoint surveys. The response rate for 2001 was 17.6% (111 responses to 631 surveys).

The use of paper surveys was a labor-intensive and expensive administration method. To further improve the response, return postage was provided with each customized survey packet and a reminder postcard showing the prizes was mailed to the entire list of potential respondents two weeks before the close of the administration period. A combination of factors associated with events of September 11, 2001 reduced the response rate for the downstate area. Most of the mail that was sent to New York City was returned unopened, some two months after the administration period closed.

About one-third of the responses for 2001 were provided via the web-enabled version of the survey. The amount of setup and administration of the web-enabled survey was not cost effective and created additional work to merge coded results from different sources.

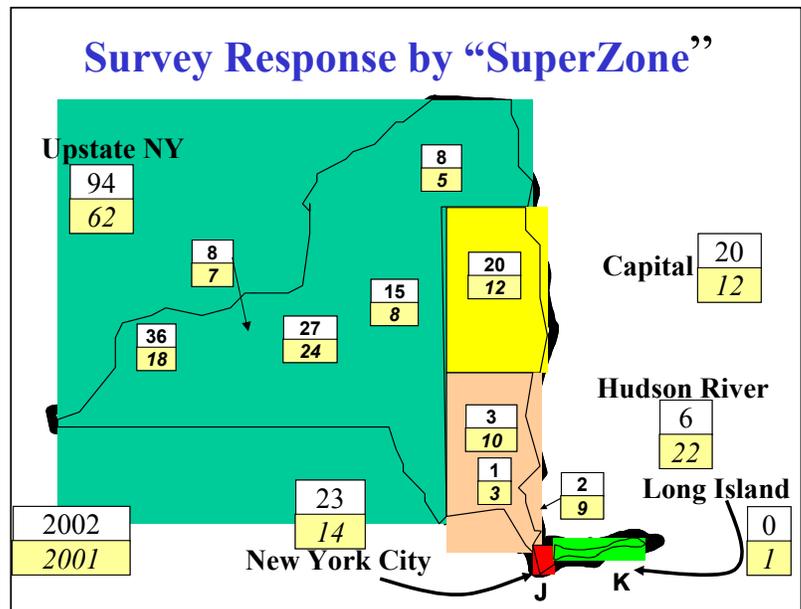
In 2002, the general satisfaction survey was administered via telephone interviews conducted by a market research firm experienced with electricity issues. While this administration method allowed us to create targeted surveys based on program segmentation, it had its limits. Calls had to be limited to no more than 20 minutes, reducing the ability to pursue many open-ended responses.

To provide for greater in-depth probing of participants’ actions to curtail, enabling technologies, and attitudes towards the programs, the PRL Audit survey was administered to a randomly selected group of participants. The PRL Audit instrument was tested with a small group of customers through personal individual interviews for timing and clarity of questions. The final PRL Audit instrument was administered by CERTS engineers as a form that was e-mailed to the respondent. The respondent returned

the form via e-mail prior to the telephone interview with an engineer. This permitted the engineer to review the responses and prepare appropriate questions for discussion, thereby creating more time to conduct the in-depth part of the telephone interview.

Both general survey and PRL Audit respondents also received the conjoint survey. In the conjoint survey, respondents were asked to rank sets of program feature combinations: payment

Figure 3. 2001 and 2002 survey response by zone



amount, penalty, start time, notice and event duration, to identify which program feature combinations respondents preferred. While the format for both years was essentially the same, in 2001, customers either mailed back the conjoint booklet or completed the conjoint questions online and in 2002, all conjoint responses were returned via fax.

Survey response data were coded into a database and analyzed using SAS to conduct cross-tab analysis of the survey response data. Additional cross-tabulations combined performance data with the survey response data to evaluate hypotheses developed during the design phase.

The response rate for 2002 was 17.2% (144 responses to 837 surveys). While the overall response rate is slightly lower than 2001, it is important to note that 23 multi-site respondents represented 106 participants, 50% of the DADRP participants (12) were among the respondents and 24% of the respondents (35) participated in the in-depth PRL audit version of the satisfaction survey.

The telephone interview method was a more cost-effective administration method for the general survey. The large number of “Do Not Call” or call blocking refusals was not anticipated in the estimation of the response rate. New York is not unique in its regulations regarding customers’ ability to block telemarketing calls, but it does warrant consideration when preparing call lists and estimating response rates.

## **Key Evaluation Results**

Preliminary results were presented to stakeholders in early November and to the Price-Response Load Working Group in early December. Final evaluation reports were delivered to stakeholders in January or February following each summer season.

### **Highlights from the 2001 Evaluation:**

- Load reduction strategies used by participants in demand response programs: The majority of respondents indicated that turning off lights was their primary strategy for load reduction during emergency events. A significant number of respondents also shut down major production to achieve contracted load reductions.
- Baseline calculation: Participants and informed non-participants identified a preference to choose between a weather-adjusted baseline and the standard method for computing performance during an event. (The baseline, or CBL, is a statistical representation of load that the customer would have otherwise used during the period of the emergency event. The standard CBL method is the average hourly usage of the highest five out of ten days preceding the curtailment event day. The weather-adjusted CBL adjusts the standard method CBL, based on consumption during hours immediately preceding the curtailment event.)
- Prior experience with curtailments: A significant finding from the survey is that demand response participants who registered for the DADRP program have had experience with utility curtailment, time-of-use or real-time pricing programs prior to joining the new demand response programs in 2000 and 2001. This finding was also identified in 2002.
- Need for consistent information about program provisions: NYSERDA and the PSC recognized the need for information outreach and designed a Demand Reduction Workshop program that was presented across the state prior to the 2002 summer season. NYSERDA also developed informational brochures about the demand response programs.
- Public benefits targeted toward participants: NYSERDA learned that participants who received public funds performed better and adjusted the focus of its Project Opportunity Notices (PONs) to further encourage participation in the demand response programs.

- Enabling technologies: Customers who had enabling technologies such as web-enabled, real-time metering performed somewhat better than customers without. Some customers indicated that the energy information was useful beyond demand response program participation for awareness of energy usage patterns. (It should be noted that the majority of customers with web-enabled metering participated in multiple programs that were called simultaneously and better performance may also have been influenced by their desire to avoid the penalty associated with one or more programs.)
- Consistent performance of load reducers: Event performance, the amount of load reduction during an event, showed that load is as reliable as generation for demand response and does not exhibit fatigue with consecutive curtailment events.<sup>4</sup>
- Establish floor price for economic program: Analysis of the DADRP program bidding behaviors indicated that a floor price of \$50/MW should be established to reduce possible gaming activities in bids.

### **Highlights from the 2002 Evaluation:**

- Participant retention: Overall retention in 2002 was high among 2001 program participants: 77% for DADRP, 58% for EDRP and 69% for ICAP/SCR.
- Customer knowledge or sophistication: Customers are unsure of how to develop a curtailment bid, the offer to reduce a specific amount of load at a specific price. While EDRP and ICAP/SCR participants felt comfortable making and executing a curtailment plan, 80% of them did not understand market pricing enough to develop a curtailment bid for the economic program. This feedback has resulted in the development of additional materials by NYSERDA to explain market pricing and guidelines for developing a demand reduction bid.
- Program awareness and uncertainty of participation benefits: Informed non-participants and EDRP participants indicated that they were either not aware of the DADRP program or that they could not determine whether the benefits of participation were worth the risk because they did not know how to quantify the benefits of the program. NYSERDA and the PSC redesigned the Demand Reduction Workshop program to provide more detailed information with examples of benefits from participation and a wider variety of public benefit funds available to support participation in demand response programs. Approximately 25% of workshop attendees subscribed to one of NYISO's demand response programs for the first time in 2002.
- The penalty in DADRP is a barrier to participation: The penalty for non-compliance was indicated as a barrier to participation in DADRP, both by the survey respondents and market participants who subscribe customers to the program. To further encourage participation in DADRP, the 10% penalty for non-compliance has been removed from the DADRP program; participants are now charged the higher of the day-ahead price or the real-time price for non-compliance.
- Performance of public funded participants exceeds that of those who do not receive public benefit funds: On average, participants who received funding from NYSERDA for enabling technology and assistance to participate in New York's demand response programs provided approximately 63% of their estimated load reduction capability, compared with approximately

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<sup>4</sup> One argument against using load as a resource for demand response is that load will not consistently reduce and participation will wane when subsequent events are called. Emergency events were called on four consecutive days in August, 2001 and load reduction remained fairly constant over all hours of each event. Generation resources showed slightly more variation from hour to hour during an event than load reduction resources.

42% of the estimated load reduction capability of participants who did not receive public benefit funds.

These results were helpful in characterizing the types of customers who participate in New York's demand response programs, the extent to which enabling technology affects performance during events, and the program features that encouraged participation or created barriers to participation. Analysis of the survey responses helped influence decision makers to implement policy changes and institute educational programs. The results also highlighted program components that worked well and should not be changed out of concern that unnecessary modifications may serve only to confuse participants and reduce participation.

### **Lessons Learned to Produce a Better Evaluation Next Time**

The evaluations of NYISO's demand response programs presented many challenges, from complex customer ownership issues to survey design and administration. Lessons learned from the first year helped refine the survey design and administration in the second year, facilitating more detailed analysis of the results. Examples of lesson learned include:

- The team approach yielded a more integrated survey design by bringing together complementary skills and experiences and by reducing the number of diverse interests found in the committee approach.
- Test the instrument beforehand with actual customers, rather than people who are actively involved in the development and marketing of the program. This will provide a better gauge to the clarity of the questions and timing for completion.
- Administration method plays a key role in survey design. Telephone and e-mail forms proved to be more effective than direct mail and web-based methods.
- Get the right participant data the first time, preferably at program registration. Multiple attempts to collect data for survey administration and analysis delays development of results.
- Offer incentives of personal value and send reminders to increase response. A two-tiered prize system helped to induce respondents to complete both parts of the survey.
- Expect relatively low customer response rates. Expanded "Do Not Call" protections and ambivalence, especially by those that did not earn benefits, must be factored into response estimates. The time lapse between the events and survey administration is another factor.

Evaluation plays a key role in the success of any new product. It helps ensure that the needs of consumers are being met and proper adjustments can be made to maintain the product, which in this case are New York's demand response programs. The combined efforts of regulators, market administrators, market participants and public benefits agencies, along with their recognition of the importance of the evaluation process, have contributed to the successful demand response programs in New York State.

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