

## **Chapter 6**

### **The Impact of NYSERDA Programs on Price-Responsive Load**

#### **Program Participation and Response**

##### ***Background***

The New York State Energy Research and Development Authority (NYSERDA) administers the state's system benefits fund. In 2001, NYSERDA added a new category of program funding aimed at helping improve grid reliability by encouraging customers to reduce summer peak demand and become more price-responsive. While the long term goal of this initiative is to promote customer participation in a variety of time differentiated pricing plans, including time-of-use and real-time pricing, the immediate focus was placed on enabling end-use customers to participate in the price responsive load programs being implemented in the summer of 2001 by the NYISO. To support the NYISO's programs, NYSERDA programs, involving information, outreach, and technical support were developed and released even before the PRL programs themselves were fully designed and approved.

Two Program Opportunity Notices (PONs) were issued by NYSERDA inviting proposals for project funding. PON 577 provided funding for a wide variety of investments that would help customers understand the time pattern of how they use electricity and underwrite some of the cost of technologies and equipment that in the long run would enable them to exercise more control over that profile to reduce demand charges or provide NYISO with additional system reserves. The second initiative, PON 585, fosters the same ethic, but was aimed specifically at investments that would enable customers to participate in the NYISO's PRL programs during the NYISO PRL program pilot, which was scheduled for 2001-2003.

**PON 577-00: Peak-Load Reduction Program**

The Peak-Load Reduction Program offers funding for projects that result in reduced peak electric demand through short-duration load curtailment measures, permanent demand reduction efforts, or through critically dispatched emergency generators. In addition, NYSERDA offered funding under this PON for installation of interval meters to encourage participation in NYISO’s price responsive load programs. Public utilities, private-sector contractors and end-use customers participated in the programs. Participation in NYISO’s EDRP program was strongly encouraged, but not mandatory to receive funding.

PON 577-00 was issued on January 29, 2001 with \$13.9 million available targeted for summer peak load reduction measures and grid connected photovoltaic (PV) systems. Applications were accepted on a first-come, first-served basis through August 1, 2001. NYSERDA received 480 applications and awarded \$6,590,214 to 86 projects that were completed by early August 11, 2001. Additional projects completed by the end of 2001 brought the PON 577-00 total to 228 projects awarded a total of \$8,497,950. This funding produced 47 EDRP participants, including 7 that also received funding under PON 585), for projects that were awarded \$5,812,850 (88%) of the PON 577 total.

**PON 585-00: Enabling Technology for Price Sensitive Load Management**

In support of NYISO’s price responsive load programs, NYSERDA issued PON 585-00 to fund projects that developed and demonstrated technologies that facilitate load reduction in response to emergency and/or market-based price signals from NYISO. Emphasis was placed on innovative technology and organizational solutions, including communications, networking, advanced metering and controls. Half of the funding was set aside specifically for projects that involved managing (curtailing) electricity usage, while the remainder was open to either load management or the use of on-site backup generation in response to curtailment events declared by the NYISO. Proposals sought project teams consisting of a NYISO market participant, a technology vendor and end-use customers that subscribed to one of the NYISO programs.

PON 585-00 was issued on December 31, 2000 with \$1.0 million available. Responses were due to NYSERDA on January 30, 2001. The seven proposals selected

for awards amounted to \$969,000 in NYSERDA funding and involved an additional \$1,035,000 in co-funding provided by participating vendors, end-users, and LSEs.

One project was subsequently not undertaken. Five of the remaining projects explicitly involved participation by its customers in NYISO demand response programs. The seventh project was a direct load control demonstration project that did not anticipate PLR program participation. The five projects that provided participants to the NYISO PRL programs represented approximately \$661,000 in SBC funding and \$759,000 project member in co-funding. For these remaining six projects, total of 243 end-users served by six different LSEs and curtailment service providers were represented in the project pool.

Two LSEs received funding: NYSEG and First Rochdale Cooperative. The other selected contractors were not electric retailers: XENERGY, eBidnergy.com, Applied Energy Group, and Enetics.

The five projects targeted toward the NYISO programs enabled approximately 67 MW of load to be available for curtailment at forty-three customer sites. During the four emergency events that were called by the NYISO in early August 2001, twenty-seven customer facilities participated and curtailed an average of 38MW per each hour. The remaining customers did not actually perform due to a variety of reasons. Two of the main reported reasons were: 1) the NYISO customer baseline load was not weather sensitive, therefore, customers with weather sensitive loads typically did not find it attractive to curtail, and 2) minimum participation thresholds (100kW per individual facility) were too high for some facilities to achieve.<sup>1</sup>

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<sup>1</sup> While the NYISO only requires an aggregation of 100 kW for participation, the utility tariffs required that each individual customer provide 100 kW of curtailable load. That latter provision prevented some customers included in funded projects from participation.

**Project Funding**

The table below summarizes the PONs and lists the number of NYISO EDRP participants that were involved with these two PONs.

PON/ Funding Area		Issue Date	Application Due Date	Responses (Facilities)	Awards for projects completed as of 8/11/01 (Facilities)	Award (\$) for projects completed as of 8/11/01	EDRP Participants
<b>PON 577</b>	<b>Peak-Load Reduction Program</b>	1/29/01	8/1/01	480	86	\$6,590,214	47 <i>(7 also in PON 585)</i>
SDLC	Short-Duration Load Curtailment	1/29/01	8/1/01	168	37	\$4,009,200	
DEGI	Dispatchable Emergency Generator Initiatives	1/29/01	8/1/01	61	10	\$2,455,000	
PDRE	Permanent Demand Reduction Efforts	1/29/01	8/1/01	188	4	\$38,014	
IM	Interval Metering	5/1/01	8/1/01	212	35	\$88,000	
<b>PON 585</b>	<b>Enabling Technologies</b>	12/31/00	1/30/01	--	5 projects	\$528,000	43 <i>(7 also in PON 577)</i>

***Summary of Summer 2001 Performance by NYSERDA-Funded Participants***

To isolate the contribution of EDRP program participants that were part of projects that received NYSERDA funding, the program benefits (Chapter 1) and price response analyses (Chapter 2) were run using only joint NYSERDA project and EDRP participation. The results of that analysis follow.

Twenty-eight percent of the participants in the EDRP program during the summer of 2001 received funding from NYSERDA. The adjacent

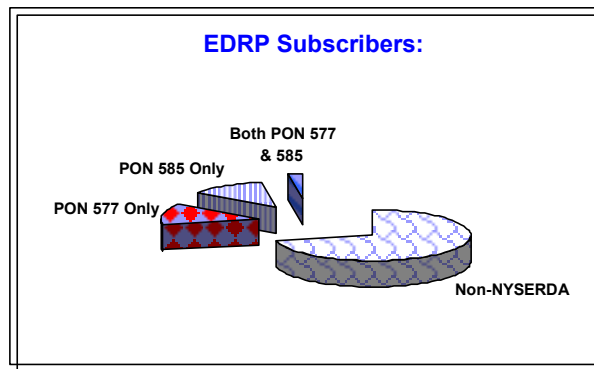


figure shows the distribution of participants between the PONs. Virtually all of the financial assistance that PRL participants reported receiving came directly from NYSERDA.

Customers that received NYSERDA PON 577 or 585 funding comprised about 28% of EDRP participants, and represented 23% of the total load pledged for curtailment and

on the average were responsible for almost 25% of the load curtailed during EDRP events last summer (see the adjacent table). Reliability and

	<b>All EDRP Subscribers</b>			
	Overall Total Number of EDRP Subscribers	Total Pledged Hourly MW Reduction	Total Average Hourly MW Performance	Wgt. Performance Ratio
Non-NYSERDA	209	545.1	316.0	0.56
PON 577 Only	40	99.6	64.2	0.66
PON 585 Only	36	53.1	31.4	0.59
Both PON 577 & 585	7	14.2	6.8	0.48
<b>Totals</b>	<b>292</b>	<b>712.0</b>	<b>418.5</b>	

collateral benefits from 2001 participation attributed to curtailments provided by these customers are estimated to be between \$7 and \$15 million.<sup>2</sup> Continued participation by NYSERDA-funded customers over the next 2-3 years, when supplies are predicted to be tight throughout the Northeast, is likely to produce annual benefits close to the same magnitude.

This price response capability and ethic will continue to result in reliability and market price benefits that inure to all market stakeholders even under improved supply conditions that would reduce the need to call upon EDRP resources. Opportunities to exercise load management strategies profitably will likely persist in the form of participation in the NYISO’s DADRP, and in retail programs offered by LSEs such as real-time pricing, like that offered by Niagara Mohawk, and time-of-use pricing plans that can be adapted to the specific capabilities of different customer groups.

The table below breaks out NYSERDA-funded customers by PON for comparison to participants that did not receive NYSERDA PON funding, for those EDRP participants that actually curtailed load during EDRP events. Load curtailing customers in PON 577 pledged twice as much load for curtailment and actually curtailed (performed) twice as much load during EDRP events as the counterparts in PON 585, despite having only half again as many participants.<sup>3</sup> Performance in this context is defined as the load curtailed

<sup>2</sup> See Chapter 1 and Appendix B to this section for the details on how the benefits attributable to customers that participated in NYISO and NYSERDA programs were calculated.

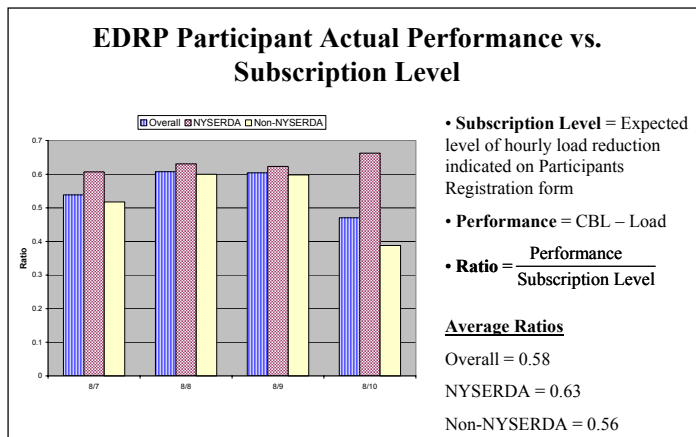
<sup>3</sup> There were 79 customers that subscribed to EDRP, but did not receive payments for curtailments undertaken during the events of August 7 – 10, 2001. This number may include participants that tried to curtail but were not possible and others that curtailed but due to the nature of the CBL calculation were not recognized as having done so.

during EDRP events compared to what the participants pledged for curtailment when they joined the program. The weighted performance ratio (the fourth column, listed individually by NYSERDA PON and other customers) is defined as the total curtailed

Subset of All EDRP Subscribers with positive EDRP Performance						
	Number of Customers	Total Pledged Hourly MW Reduction	Total Average Hourly MWH Performance	Wgt. Performance Ratio	Total Summer 2001 MW Performance	Total Summer 2001 Program NYISO Payments
Non-NYSERDA	154	472.0	316.0	0.67	6,041.4	\$3,069,601
PON 577 Only	32	83.1	64.2	0.77	1,427.4	\$748,566
PON 585 Only	22	48.2	31.4	0.65	568.9	\$287,442
Both PON 577 & 585	5	13.6	6.8	0.50	121.8	\$61,471
<b>Totals</b>	<b>213</b>	<b>616.9</b>	<b>418.5</b>		<b>8,159.4</b>	<b>\$4,167,079</b>

load of the customers that comprise the group divided by the total hourly subscription values for those same customers. In total, NYSERDA-funded customers provided about 2,118 MWH of load curtailments and received \$1,097,479 from the NYISO in EDRP payments, in each case about 25% of the program total.

As a portfolio, NYSERDA-funded customers outperformed the other EDRP participants, as the chart illustrates. The relatively low performance (0.50) in the table above) of customers funded from both PON 577 and 585 was outweighed by the above average performance of the PON 577 customers (0.77 in the table), resulting in an overall average performance ratio of 0.63 for NYSERDA-funded

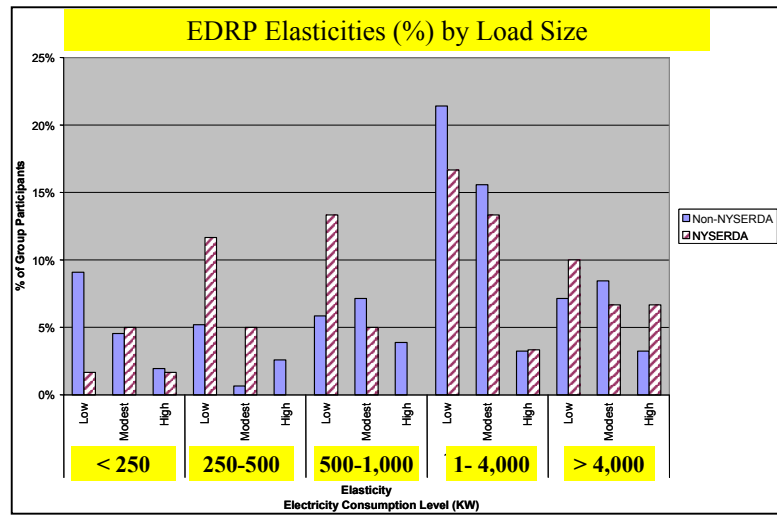


participants. The values in the figure compare NYSERDA-funded customers as a group with all non-NYSERDA-funded customers. The reliability or performance of EDRP participants is important to NYISO dispatchers that are responsible for determining the impact of EDRP resources on system reliability. More precise estimates of participants' curtailment capabilities make the PRL resources more reliable, and therefore more valuable. A higher curtailment performance result in more bang-for-the-buck from the perspective of investing in price-responsiveness -- it reduces the number of participants required to provide a specified level of curtailment, which reduces transactions costs. The

higher yield and performance exhibited by NYSERDA funded participants may reflect these customers’ better understanding of how and when they respond as a result of the technical assistance studies undertaken with NYSERDA support.

As the figure below illustrates, the price responsiveness, measured by their price elasticity, of NYSERDA-funded customers tends to be somewhat higher than that of other small participants (those under 500 kW) but lower than that of other larger participants (those over 500 kW), with a few noticeable exceptions. NYSERDA-funded participants over 4 MW outnumbered others in the category of high response by two to one. They constituted over half of those participants categorized as highly responsive in the 1-4 MW size.

One might expect that in general participants that received support for funding would be more price-responsive than other participants. There are however several intervening



factors. First, some of participants, especially the larger ones, had participated previously in load management programs offered by their utility. Several participants concurrently faced commodity rates that were derived from hourly NYISO DAM prices. These two customer groups are likely to have already taken some measures to become price responsive, and therefore exhibited higher price elasticity when enrolled in EDRP.

The NYSERDA funding to encourage NYISO PRL program participation was focused on making customers more price responsive. Such investments would be especially attractive to customers, and more so to smaller customers, that otherwise would not see themselves as being capable of reducing their load under the provisions of EDRP. In other words, the initial impact of NYSERDA funding may be that it was responsible for getting customers to participate that otherwise would not have. Their perceived or actual curtailment capabilities therefore are likely to be low or modest at first, until they gain experiences in matching opportunities for payments with ongoing

business imperatives. Over time, these customers become more familiar with the programs’ operation, and they may find additional ways of responding using the initial endowment of knowledge and information supported by NYSERDA, they will become more price responsive, which increases the benefits both they and non-participants realize.

NYSERDA programs contributed to the diversity of participation in the NYISO’s PRL programs. As the adjacent table shows, NYSERDA funding resulted in participation in several business categories that otherwise would not have been represented. Diversity of circumstances is important to the portfolio of PRL resources. An individual customer’s willingness to respond to curtailment calls will depend on the exigent circumstances,

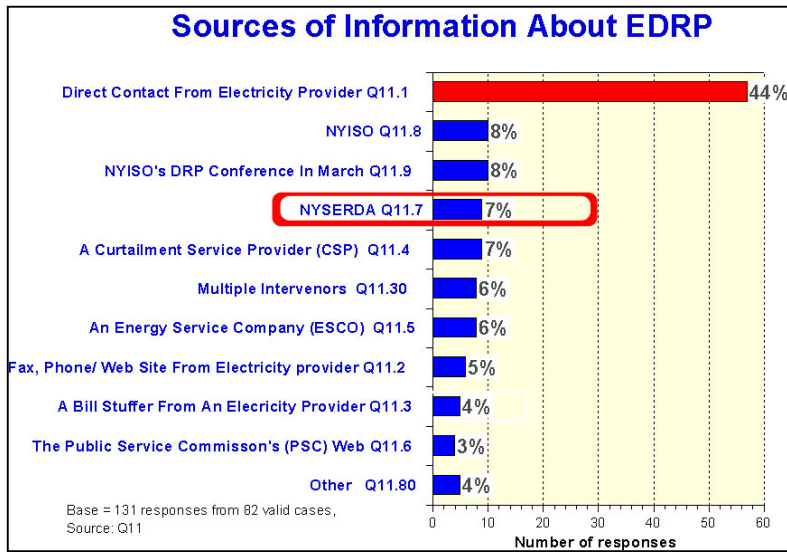
SIC	SIC Description	NYSERDA Participants
13	Oil and Gas Extraction	1
14	Mining and Quarrying of Nonmetallic Minerals, Except Fuels	5
15	Building Construction General Contractors and Operative	1
20	Food and Kindred Products	4
22	Textile Mill Products	1
26	Paper and Allied Products	2
27	Printing, Publishing and Allied Industries	2
28	Chemicals and Allied Products	3
30	Rubber and Miscellaneous Plastic Products	5
32	Stone, Clay, and Glass Products	2
33	Primary Metal Industries	2
35	Industrial Machinery and Equipment	5
36	Electronic and Other Equipment	2
38	Instruments and Related Products	1
39	Miscellaneous Manufacturing	1
48	Communication	10
49	Electric, Gas, and Sanitary Services	1
50	Wholesale Trade - Durable Goods	2
51	Wholesale Trade - Nondurable Goods	1
53	General Merchandise Stores	4
65	Real Estate	9
72	Personal Services	1
80	Health Services	6
82	Educational Services	1
91	Executive, Legislative, and General	4
99	Nonclassifiable Establishments	7
TOTAL		83

including the day of the week and the time of day the event is called, its production obligations or customer traffic demands, how its usage is affected by prevailing conditions, and how many times in the recent past curtailment calls have been responded to. A PRL portfolio that contains a variety of customers reduces the chances that participants simultaneously face circumstances that reduce, or eliminate altogether, their ability to respond to a curtailment call. An important benefit from NYSERDA’s programs is the contribution to the diversity of the EDRP portfolio available to the NYISO. In the future, NYSERDA should work with the NYISO to establish measures of PRL portfolio diversity and direct its funds, in part, to adding to its diversity by attracting specific customers or promoting specific price response behaviors or technologies.



The value of NYSERDA’s interest in and support of the design and implementation of PRL programs went beyond those benefits directly associated with the projects it funded. Survey respondents mentioned the brochures NYSERDA prepared and distributed as a source of information about the PRL, and NYSERDA’s active participation in a PRL workshop in March also helped customers discover the opportunities the PRL programs offered. Given the importance of the dissemination of information to help customers understand these programs and the opportunities they present, an expanded role by NYSERDA in customer education and training would most likely yield high returns.

Process Improvement (PI) surveys completed by all six LSEs and two CSPs provided another source of information about the performance of NYSERDA



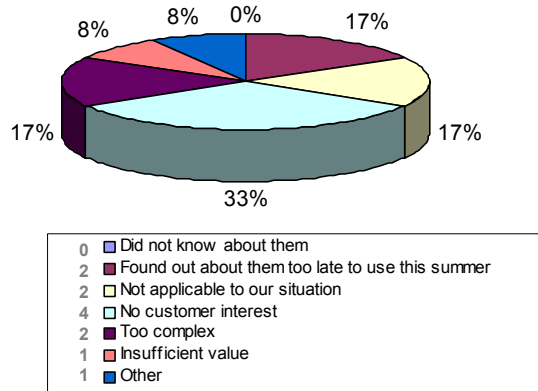
programs.<sup>4</sup> Since these entities are the ones that contact end-use customers and recruit their participation, their perspective is valuable. Survey respondents were asked to rate the performance of the entities responsible for the design and implementation of the PRL programs, NYSERDA, NYISO and NYS Department of Public Service.

Only two of the eight respondents reported that they participated in either PON 577 or PON 585. The reasons given for not participating by four respondents, illustrated in the graphic below, are revealing and require redress. One said that it found about them out too late to apply for the summer of 2001, echoing a complaint voiced by some participants in the NYISO’s PRL Working Group proceedings and again in other program evaluation efforts (see the section below on case studies). Perhaps the traditional communication channels NYSERDA uses do not reach new entrants, such as CSPs. NYSERDA should be aware that new actors are becoming involved in this market,

<sup>4</sup> All CSPs were invited to respond to the process improvement survey. See Chapter 5 for details.

## Process Improvement Survey Findings

**Reasons for not participating in either PON 577 or PON 585**  
*(multiple response question - 4 responses)*



entities that are outside the traditional communications circle comprised of utilities and state agencies, and make sure that program notices are posted where these new market entrants will encounter them.

In addition, the restructuring of the state’s investor-owned utilities has disrupted long-standing organizational linkages. New individuals serving in new jobs may not be linked into NYSERDA’s historic lines of communications, and may not receive timely notice. Because PRL benefits are concentrated in the summer months, recruitment efforts will be concentrated in the late winter and early spring months. This is when LSEs and CSPs will be designing their program campaigns and looking for ways to improve customer participation expectations. NYSERDA should continue to gear the timing of its program offers accordingly so that all eligible entities find out about these opportunities in a timely manner.

About 50% of LSE/CSP respondents reported that either the NYSERDA programs were not applicable to their situation, or that their customers were not interested in them. Another 17% said the programs were too complex and therefore they did not apply for NSYERDA funding. These sentiments are puzzling. NYSERDA programs offer customers funding for technologies and instruments that would make them more price responsive, which in turn makes them able, or better able, to participate in NYISO PRL

programs and earn curtailment benefits of up to \$60,000/MW of curtailable load.<sup>5</sup> LSEs and CSPs should be highly motivated to leverage NYSERDA funds into the arrangements they make with customers to accomplish PRL program participation and response. Yet half report that the programs were not applicable to just such circumstances. This paradox may be due in part to the fact that the PRL programs were not approved until late winter, after NYSERDA PON 585 funding had been allocated. NYSERDA needs to continue to investigate what customers' needs are and work with their clientele, the LSEs and CSPs, to design programs that find widespread acceptance and participation.

### ***NYSERDA Contractor Interviews***

As part of the NYISO PRL Evaluation, NYSERDA selected six contractors to provide feedback on their experience with funding programs supporting NYISO's price responsive load programs, PON 577 and PON 585. Each contractor was asked to complete the NYISO Process Improvement Survey<sup>6</sup> as a starting point for the interview. Project background information, including project reports to NYSERDA, was provided to Neenan Associates. In addition, each contractor was interviewed to collect additional insight.

A Contractor Interview outline was developed as a guideline for the interviews<sup>7</sup>. This outline covered four topical areas:

- Contractor Profile
- Getting Involved with NYSERDA Programs
- Contractor's Perspective on Program Value
- Solutions Proposed

Neenan Associates conducted in person or via conference call interviews. The tables in Appendix B summarize the responses provided to these questions, organized by topical area, and selected comments and suggestions that contractors wished to convey.

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<sup>5</sup> Based on combined ICAP and EDRP participation last summer in New York City. The benefit level upstate under comparable programs was 40% of that available in NYC.

<sup>6</sup> NYISO sent a process survey to each LSE and CSP who subscribed customers to the 2001 PRL programs. Results of those survey responses are discussed in the NYISO Final Report, Chapter 5.

<sup>7</sup> Five of the six contractors were interviewed; the sixth contractor's project report was used as a substitute for a personal interview.

Most of the contractors were familiar with NYSERDA. Four reported having been involved previously with a NYSERDA PON and two reported that they had participated previously in PON 577. The contractors reported that NYSERDA funding played an important role in attracting customers to their programs and that for the most part they were satisfied with their relationship with NYSERDA. One contractor described how NYSERDA funding through PON 577 for a project primarily focused on reducing demand introduced his customer to the benefits of participation in PRL programs. By understanding better how and when it used electricity, the customer discovered that, with a few changes in how it organized its assembly process, it would be able to curtail a substantial portion of its electricity usage on relative short notice. Before, the customer had rejected out-of-hand any involvement in the NYISO's PRL programs. Now, it is investigating how it can turn its load management capabilities into cash.

Another contractor had labored to convince a customer with extensive backup generation resources to take advantage of the opportunities the EDRP program offered to recoup some of the investment. However, without a comprehensive study of the risks and costs involved, the firm's management was reluctant to undertake any risks. After all, the very reason for the generation was to prevent outages to critical functions. The NYSERDA program and funding structure allowed the contractor to demonstrate conclusively that the backup generation units could be run under EDRP events conditions without jeopardizing internal functional reliability and generate a cash flow from what otherwise was a low-yield asset. The customer's project coordinator stated that without the study, he never would have been able to get management approval. Now, this program enjoys high visibility internal to the company as an example of aggressive asset management, which reflects well on the project manager, and has motivated him to lobby for similar program opportunities at other facilities throughout the country.

In both of these cases, customers perceived significant risks associated with managing loads against electricity price volatility. Risks that they were unwilling to undertake. The NYSERDA program funding helped break down these barriers by providing information, technical support, and enabling technology that reduce risks and thereby made PRL program participation an acceptable proposition. Other projects

attacked the risk aversion hurdle by concentrating on providing electricity consumption information in a timely and useful manner.

Three contractors focused attention on providing the customer with up-to-the-minute data on how it was using electricity to help it develop decision rules that it could invoke when the NYISO activated its PRL programs. A major hurdle to program participation is that many customers have latent load management capability: they are not aware that certain functions are discretionary and therefore can be used to earn benefits through PRL program participation. An important first step to making these capabilities used and useful is to educate customers on these latent opportunities. The contractors reported that information systems, which were funded in part by NYSERDA, were vital to getting customers to agree to participate in NYISO programs. The lesson learned is that relatively modest investments in information systems can have a large impact on participation in PRL programs.

The contractors also provided constructive criticism aimed at making the NYSERDA programs more attractive to them and to their customers. A common theme was greater access to a more responsive NYSERDA staff to resolve issues more quickly, perhaps by assigning a key account manager to the larger contractors that would facilitate managing multiple projects across several PONs. One went so far as to recommend that NYSERDA open and staff regional offices to better manage contracts and to promote the dissemination of information about available funding to prospective contractors and customers.

As for the PONs themselves, some contractors complained that NYSERDA projects are subject to delays and rescheduling that adversely impact making commitments with customers. One noted that programs were too inflexible and therefore out of phase with opportunities for investments that are tied to scheduled plant shutdowns. In addition, some expressed the opinion that the evaluation process was too slow, and PON 585 was particularly singled out as a program that was made available too late in the year to for many to take maximum advantage; customers need more time to consider program participation, and contractors need more time to install and test equipment.

### **Contractor Case Study Summary**

NYSERDA's contractors are generally satisfied, but offered many suggestions for improvement, especially in the areas of support and program timing. Suggestions for support improvements include designating key account managers to handle larger contractors who are active in multiple PONs and establishing regional offices to make NYSERDA more accessible to contractors and customers around the state. Program notification and duration (the time period for which projects can be proposed for funding) are listed as key areas for improvement to permit contractors to mobilize a project team, and to order and install equipment.

### ***Customer Case Studies***

With funding support from the Department of Energy, Lawrence Berkeley National Laboratory (LBL) conducted research in the impact of technologies on price-responsive load programs. Their method involved conducting in-depth interviews of certain program participants to characterize how they used technologies to accomplish load curtailments. LBL arranged with NYSERDA to use its PON 577 and 585 contractors are subjects for its study.

LBL selected a group of 14 individual customers that participated in NYISO price responsive load programs through NYSEG, AES NewEnergy, and eBidenergy/ConsumerPowerLine. These contractors used funding from NYSERDA to apply enabling technologies that were hypothesized to improve customers' ability to curtail load. Both NYSEG and eBidenergy/ConsumerPowerLine offered their customers access to their hourly load data on a day-after basis and, during curtailment events, on a near-real-time basis.

LBL project analysts conducted phone interviews with most customers, however 25% of customers provided initial responses to the survey protocol via email.<sup>8</sup> LBL combined the survey results with load data during the curtailment events of August 7-10, 2001 to evaluate the impact of technology on curtailment responses.

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<sup>8</sup> Energy analysts at Pacific Northwest Laboratory, under the direction of the LBL project manager, conducted interviews with the customers.

**Performance Indicators**

LBL developed two indicators, the subscribed performance index (SPI) and the peak performance index (PPI), to measure how well customers performed during curtailment events. The SPI is a ratio of the customer’s actual hourly load curtailed averaged over all hours of curtailment divided by the customer’s subscribed load, which is the target they set for themselves at the outset of the program. The PPI has the same numerator, but the denominator is the customer’s non-coincident facility peak demand and provides an indicator of performance relative to the technical potential of load curtailment for that customer.

The table below shows the average value and standard deviation for the sample of 14 respondents when sorted into subgroups according to whether, in addition to participating in the NYISO EDRP, they coincidentally participated in the SCR/ICAP program and whether they possessed and were able to use back-up generation (BUG).<sup>9</sup>

**Customer Performance in EDRP Program**

Customer Group	N	(SPI)	(PPI)
Customers w/ BUG	7	1.04 +/- 0.55	0.46 +/- 0.37
Customers w/o BUG	7	0.32 +/- 0.30	0.05 +/- 0.04
Customers in EDRP and ICAP	8	0.92 +/- 0.61	0.41 +/- 0.37
Customers in EDRP only	6	0.35 +/- 0.31	0.05 +/- 0.05

Based on the two performance indicators (SPI and PPI), LBL found that those customers with back-up generators and those who participated in the ICAP program had much better performance compared to customers that participated only in the voluntary EDRP program or did not have back-up generators. The reasons for these differences are straightforward. Customers with back-up generators have much more discretion over how and how much they reduce their total load in response to curtailment events. As a result of possessing this strategic asset, these seven customers were able to meet, and often out-

perform, their subscribed goals (i.e., SPI of 1.04) and their actual curtailed load represented about 46% of their non-coincident facility peak demand (see Table ES-1).

Customers participating in the ICAP program, however, face a substantial performance penalty if they do not attain their demand reduction amount when called by the NYISO. For them this is not a “voluntary” program, and they must consider the consequences on noncompliance when called to curtail. These eight customers, on average, performed near their subscribed load targets (i.e., SPI of 0.92).

The seven customers that relied on load reductions only to curtail typically employed a variety of conservation and operational strategies (e.g., turning off lights, resetting thermostats, reducing pump and compressor loads). Their pledged curtailment as a fraction of facility peak demand was low, averaging 5% over our sample. There was no evidence of Customer Performance “fatigue” found over the limited number of curtailment events in Summer 2001. Customers in all subgroups performed as well or better on the second and third day of curtailment as on the first.

### **Impact of Enabling Technologies**

A major objective of LBL work was to assess the impact of enabling technologies on customer’s demand response capability and performance. Even in the small sample used by LBL, some impacts were evident: (1) web-based near-real time load monitoring was very useful for setting, and tracking progress toward, load reduction targets, (2) some customers have quickly adopted the technology for other energy management uses (e.g., turning off various processes to see impact on overall load), (3) the installed base of back-up generation provides an important load curtailment resource, and (4) almost all of the customers surveyed by LBL relied on manual approaches to respond to curtailment events, rather than automated response.

### **Primary Customer Motivations for EDRP Program Participation**

Customers indicated that the primary motivators for working with the NYSERDA contractors and participating in the EDRP program were saving money on their utility bill, access to economic incentives offered by the program, and the fact that program

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<sup>9</sup> The SCR/ICAP program allows customers to sell certified curtailable load to LSEs to cover their installed capacity requirements. These customers are required to curtail usage during system emergencies in order to retain their certification and receive ICAP payments from LSEs



participation was voluntary and that they therefore retained control over whether or not and how much load to curtail.

### **LBNL and PNNL Suggestions for NYSERDA**

Given the fact that the NYISO programs are relatively new and that it takes users some period of time to realize the full benefits of adopting innovative demand-response technologies, LBNL recommend that NYSERDA consider additional evaluation/case studies in order to (1) document other benefits (besides load curtailment capability) that customers receive from enabling technologies supported in the Peak Load Reduction Program, and (2) develop a more robust understanding of relationships between adoption of enabling technologies, performance of customers individually in curtailing load, and the influence of other confounding factors (e.g., participation in other programs, such as ICAP/SCR).

### ***Summary and Recommendations***

NYSERDA funding serves an important role in promoting participation in the PRL programs implemented by the NYISO. NYSERDA fosters greater program participation, which is critical because a good understanding of the program is the key determinant to the decision to participate or not. The uninformed customer errs on the side of nonparticipation. NYSERDA funding makes participation possible by customers that otherwise would find curtailing load too daunting. As a result, more customers are afforded the opportunity to participate and learn through the experience. These include smaller customers and those that have not participated previously whose diversity of circumstances makes for a more robust portfolio of PRL resources.

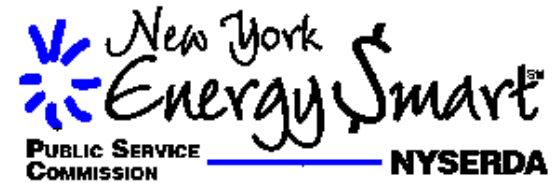
In the summer of 2001, NYSERDA-funded EDRP participants are estimated to have contributed between \$7 and \$15 million in benefits that were distributed across all end-use customers served by the NYISO. Moreover, the investments made by customers will have lasting value, both in terms of their impact in the next couple of years under EDRP, and over the long run as the price-responsive capability is used in other retail pricing programs.

Given the importance of NYSERDA programs to the development of a robust market for price responsive resources, it is important that these programs are considered

as works in progress that are constantly reshaped to reflect what is learned from experience. NYSERDA should actively and continuously ask for feedback from LSE and CSPs, and regularly seek the direct input of customers to ascertain their preferences and needs. It also should establish rigorous program evaluation standards and fund routine and comprehensive evaluations to measure program performance. Customers awarded such funds should be required to participate in NYISO PRL programs and be required to cooperate with any related program evaluation efforts.

NYSERDA PONs that fund enabling technologies, such as controls, should be administered to coincide with the marketing efforts of LSEs and CSPs and closely managed to ensure that the proposed measures are installed in time for the summer season. To help build customer involvement on an ongoing basis, it should provide more flexible funding initiatives that allow customers and their retailers to submit proposals for review throughout the year, especially for smaller investments in metering and monitoring equipment designed to get customers involved as a first step toward participation. Additionally, specific initiatives should be launched to educate customers on the provisions of PRL programs, and help them assess the benefits. Generic information campaigns will overcome skepticism arising from uncertainty, which will increase customer interest and attract more entities to market PRL programs.

Finally, NYSERDA should recognize the implications of the underlying principle of PRL programs: *a little bid goes a long way*. It may not necessary to get every customer enrolled, since only 10-20% of all consumers are likely needed to ensure efficient market performance. However, developing a widespread price-responsive ethic has enduring benefit as it will encourage customers to consider ways to make permanent adjustments in their schedules consistent with time-of-use pricing and other scheduled-driven pricing arrangements.



# Chapter 6

# NYSERDA Deliverables

**Prepared By:**  
**Neenan Associates**  
**January 17, 2002**

# Table of Contents

- Response Analysis and Choice Models
- Program Population and Survey Sample
- Customer and Process Improvement Survey Responses

# Measures of Price Impacts

*Complete details for this section can be found in Chapter 1 of the NYISO Final Report*

# System-Wide Effects of **EDRP** and **DADRP**

	Program	
	EDRP	DADRP
<b>Collateral System Savings</b>	<b>\$12,954,581</b>	<b>\$1,468,545</b>
<b>Hedging Cost Benefits</b> <i>Three Summer Months</i>	<b>\$11,605,572</b>	<b>\$2,047,074</b>
<b>Reliability Benefits</b>		
<b>@ Outage Cost of \$1,500/MW</b>	<b>0.09</b>	<b>NA</b>
<b>@ Outage Cost of \$2,500/MW</b>	<b>0.05</b>	

# EDRP Event Market Price Effects

Zone	Arc Price Flexibility	Average Hourly % Reduction in Due to EDRP		Total (All Hrs) Collateral Savings	
		Load	RT-LBMP	Zonal	% of Total
Capital New York	9.2	3.1%	28.8%	\$3,036,211	23.4%
Long Island	11.2	0.3%	4.1%	\$2,652,298	20.5%
Western New York	4.6	3.3%	21.5%	\$6,359,512	49.1%
Hudson Region	6.6	0.5%	3.8%	\$906,559	7.0%
<b>NYISO Total</b>				<b>\$12,954,581</b>	

- Two factors contribute to the change in Zonal LBMP:
  1. Supply Price Flexibility ( $\% \text{ Change in LBMP} / \% \text{ Change in Load}$ )
  2. % Load Reduction
- Largest price changes in Zones where:
  1. Price Flexibility is high and/or
  2. % Change in Load is high.

# EDRP Effect on Average Price and Price Volatility (August: 6 AM – 10 PM)

Zone	RT-LBMP (\$/MW) (with EDRP)		RT-LBMP (\$/MW) (without EDRP)		Mean LBMP reduction  (\$/MW)	LR Hedge cost reduction
	Mean	Standard Deviation	Mean	Standard Deviation		
Capital	\$72.83	113	\$76.89	129	\$4.05	\$851,778
New York	\$100.70	148	\$101.36	149	\$0.66	\$831,658
Long Island	\$120.74	147	\$120.86	147	\$0.12	\$61,709
Western New York	\$58.21	82	\$60.12	91	\$1.91	\$1,880,389
Hudson River Region	\$86.35	126	\$86.95	128	\$0.60	\$242,989
<b>Total</b>						<b>\$3,868,524</b>

- EDRP reduces average LBMP for entire month of August
- If this reduction is ultimately reflected in bilateral contracts, the cost of hedging roughly 40% of Day-Ahead Load falls by nearly \$4 Million
- Reduction in price volatility significant in Capital and Western NY



## DADRP Market Price Effects

Zone	Arc Price Flexibility	Average Hourly % Reduction Due to DADRP		Total Collateral Savings
		Load	LBMP	
Capital	4.1	0.3%	1.2%	\$1,016,740
Western NY	3.8	0.4%	0.4%	\$451,805
<b>Total (All Hrs)</b>				<b>\$1,468,545</b>

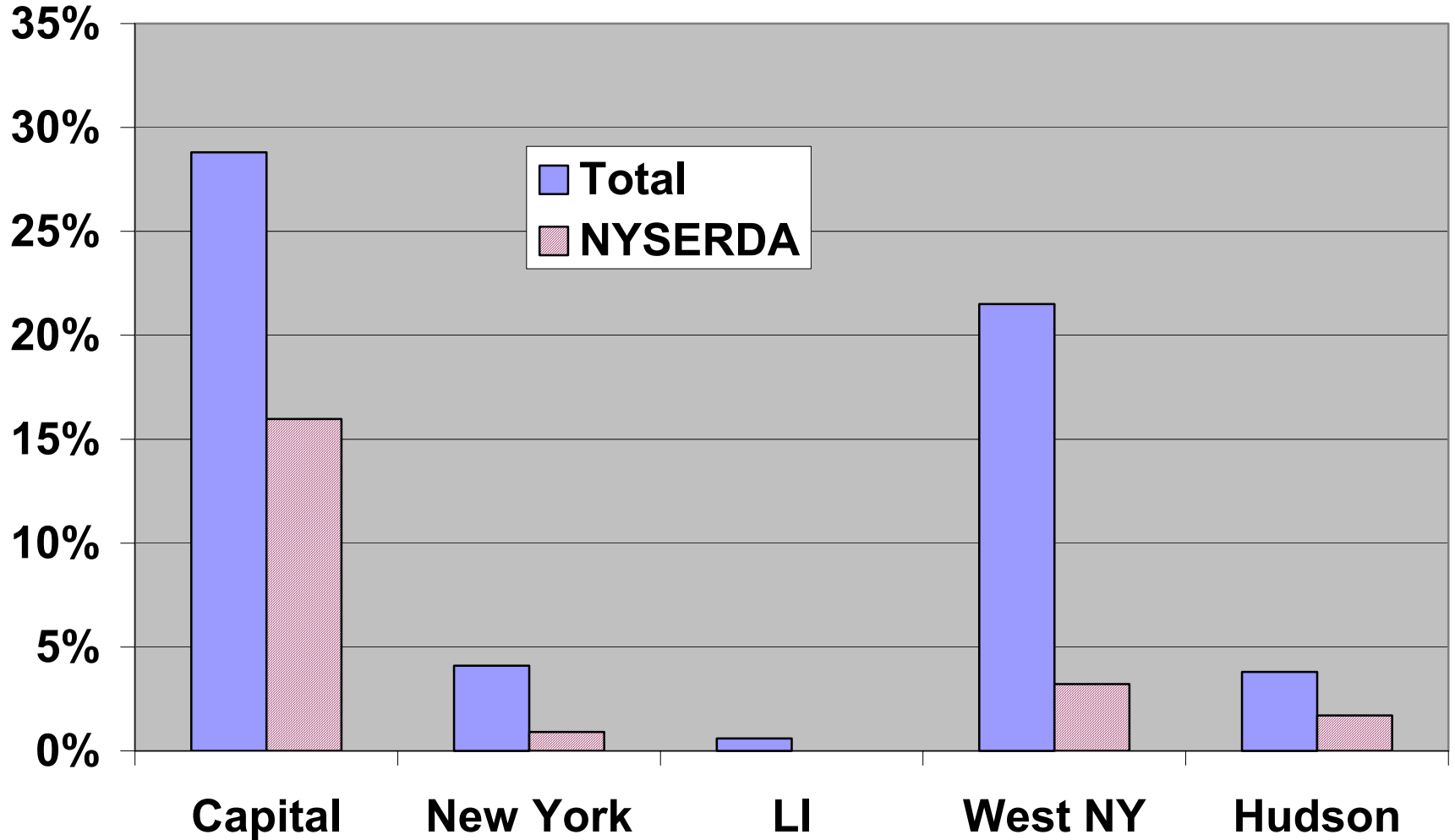
- Price response, as measured by the Arc Price Flexibility, in Emergency Program exceeds response in Day-Ahead Program by roughly 2 to 1.
- Price response differences between programs due largely to DADRP Load being scheduled at times when zonal load was relatively low

## DADRP Effect on Average Price and Price Volatility (6 AM – 10 PM)

Zone	DAM-LBMP (\$/MW) (with DADRP)		DAM-LBMP (\$/MW) (without DADRP)		Mean LBMP reduction	LR Hedge cost reduction
	Mean	Standard Deviation	Mean	Standard Deviation		
<b>Capital</b>						
July	\$43.41	\$12.06	\$43.52	\$12.29	\$0.11	\$31,277
August	\$82.22	\$102.56	\$83.64	\$107.82	\$1.42	\$446,303
<b>Western NY</b>						
August	\$71.88	\$91.55	\$72.38	\$92.82	\$0.51	\$204,778
<b>Total</b>						\$682,358

- In spite of the small amount of DADRP scheduled, the long-term reduction in the cost of hedging load is noticeable

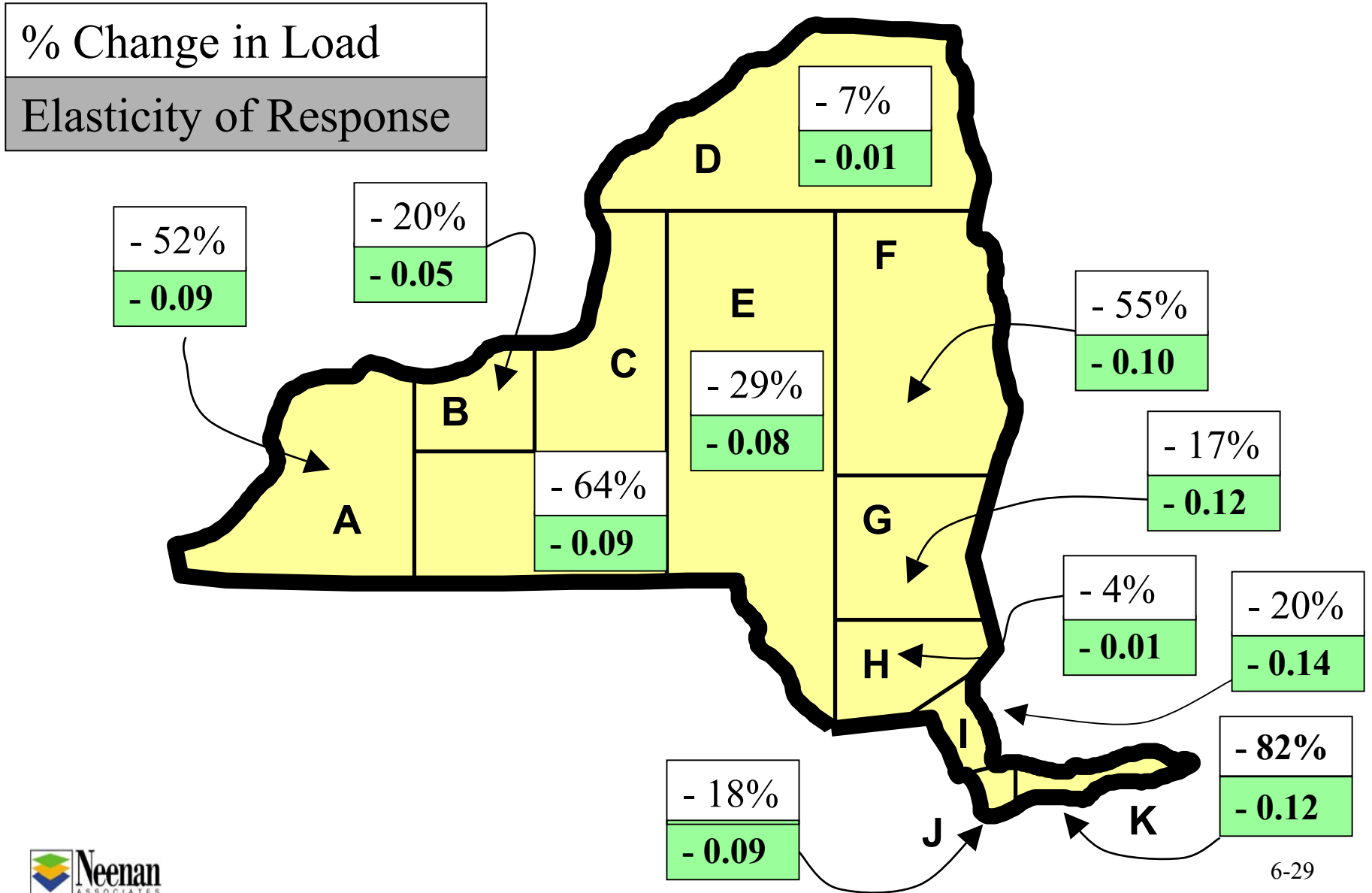
## Percentage Change in RT LBMP



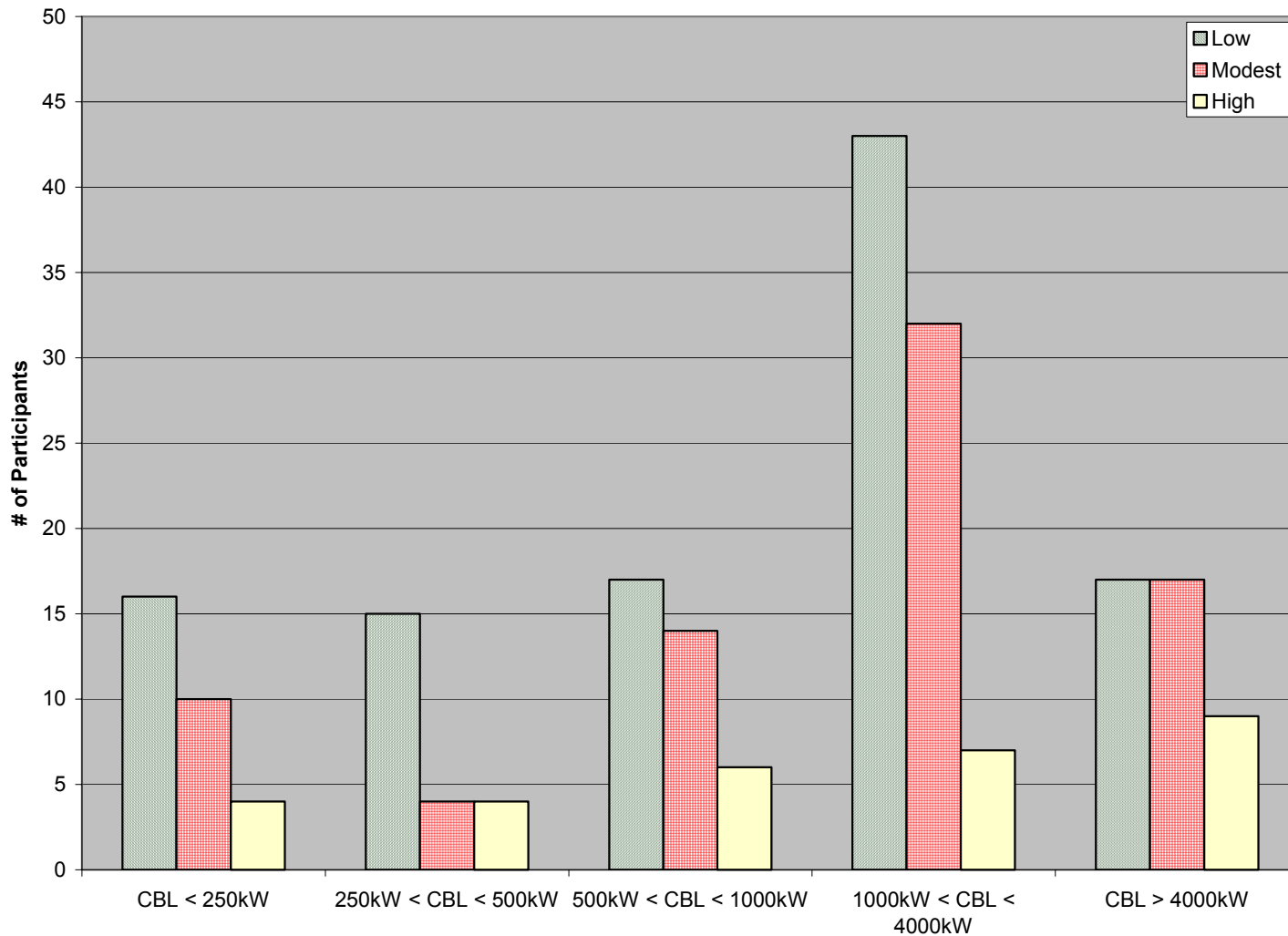
# Measures of Price Responsiveness

*Complete details for this section can be found in Chapter 2 of the NYISO Final Report*

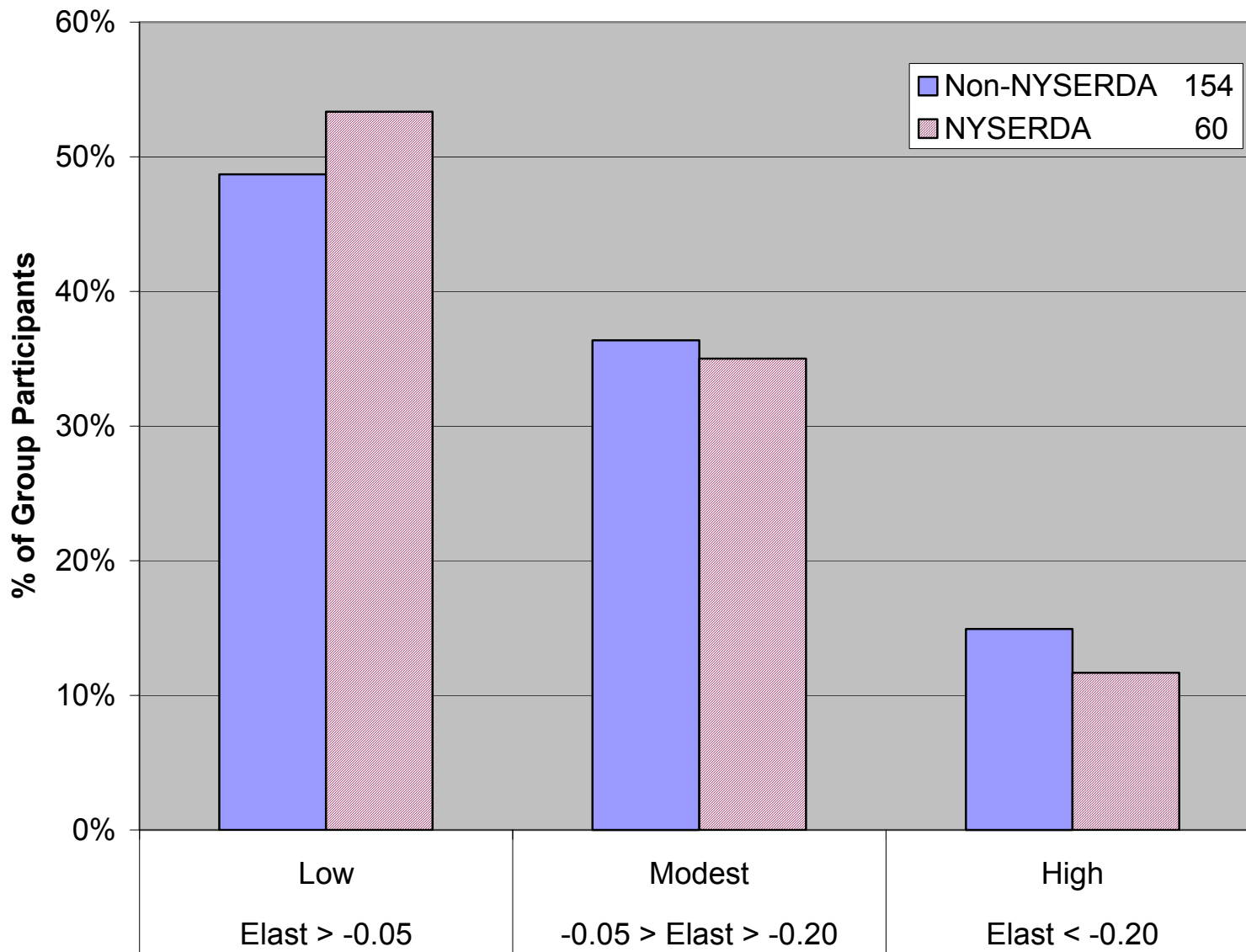
# Zonal Measures of Performance



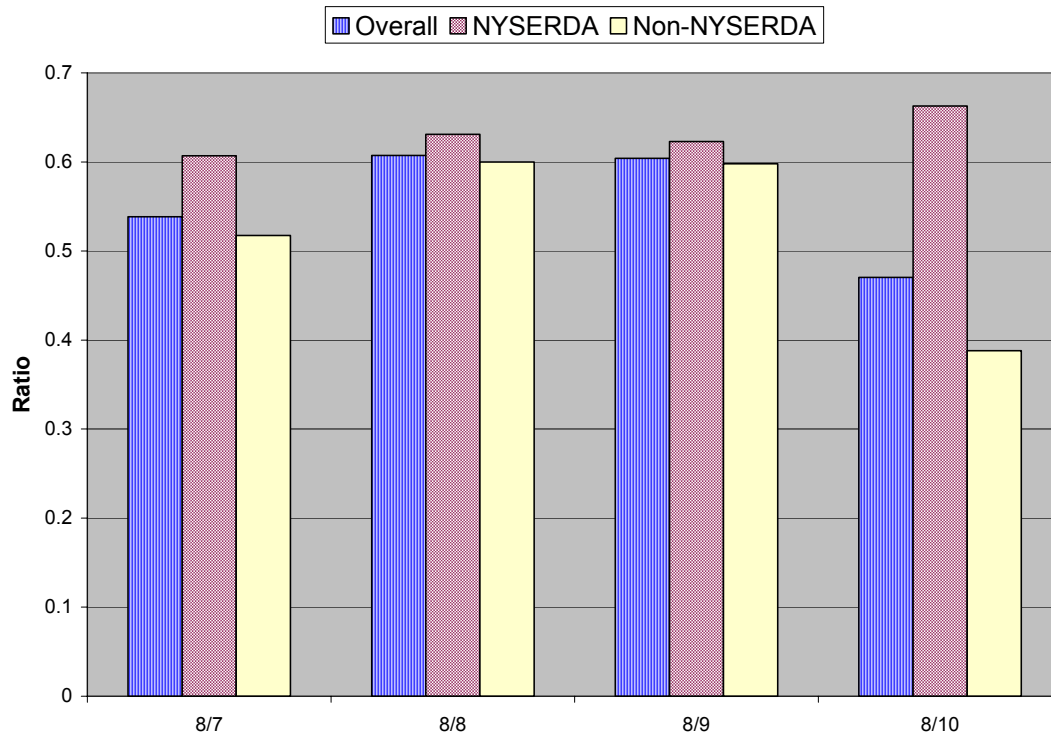
# Distribution of Response Elasticities by Firm Load



# EDRP Distribution of Response Elasticities



# EDRP Participant Actual Performance vs. Subscription Level



- **Subscription Level** = Expected level of hourly load reduction indicated on Participants Registration form

- **Performance** = CBL – Load

- **Ratio** =  $\frac{\text{Performance}}{\text{Subscription Level}}$

## Average Ratios

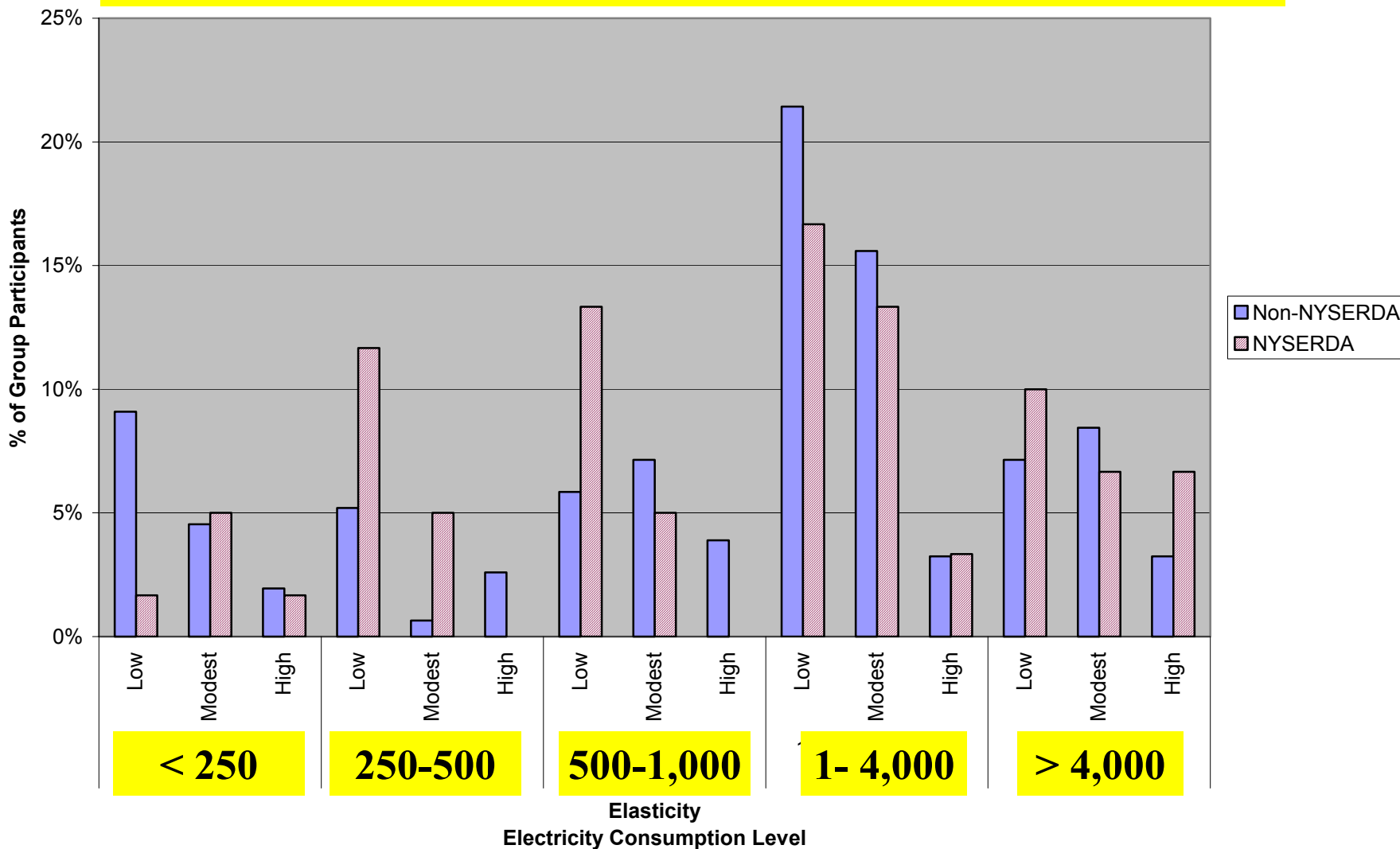
Overall = 0.58

NYSERDA = 0.63

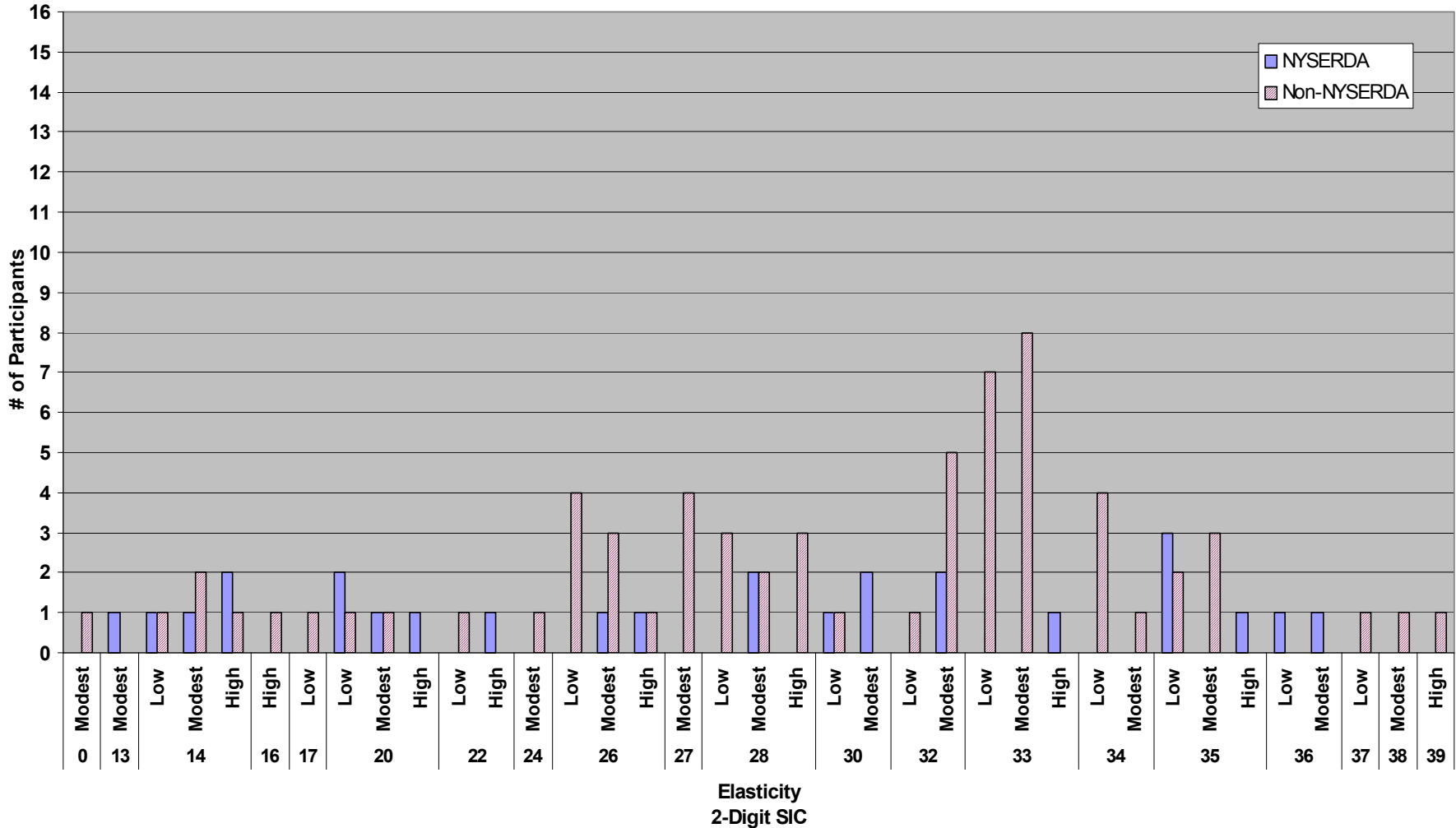
Non-NYSERDA = 0.56



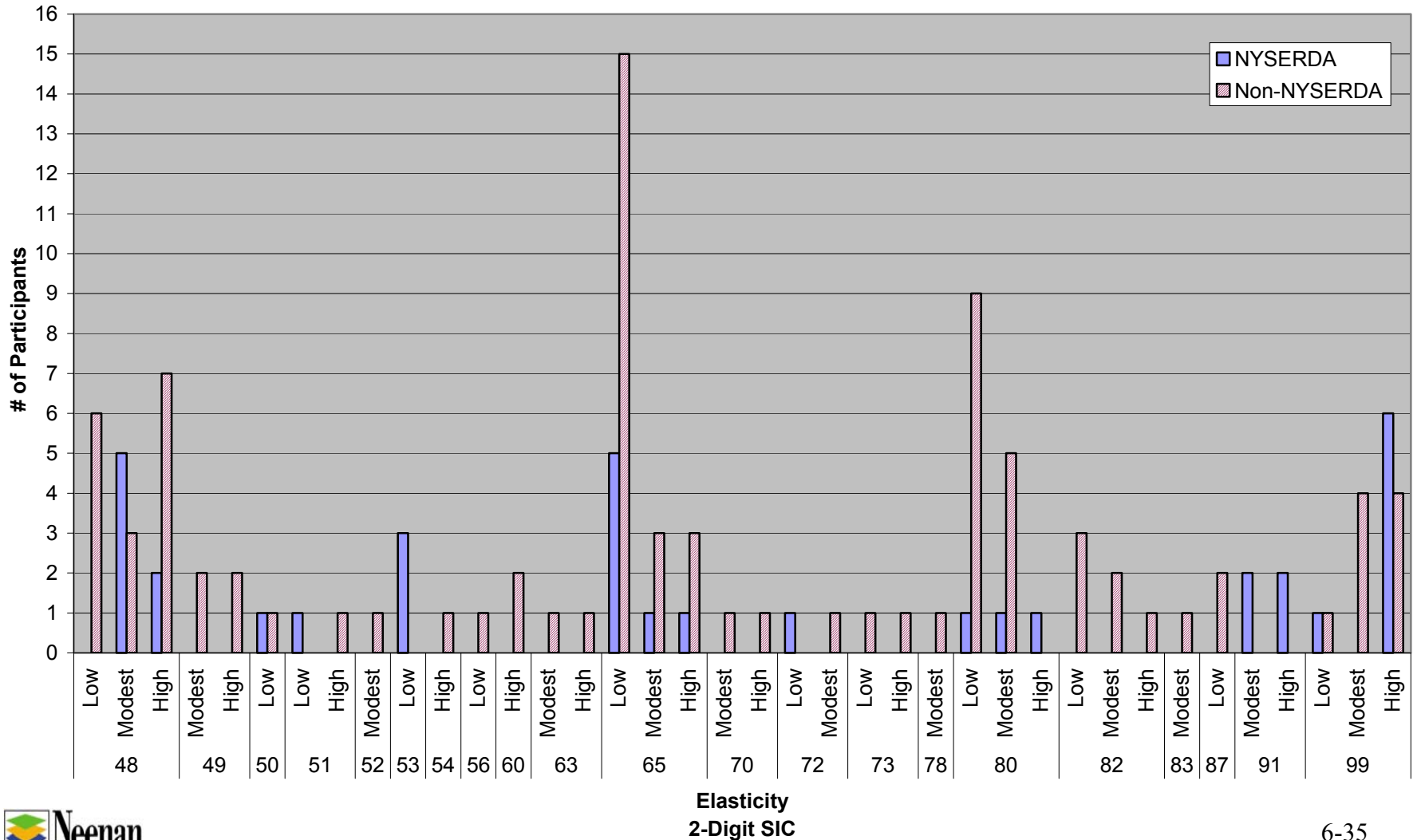
## EDRP Elasticities (%) by Load Size



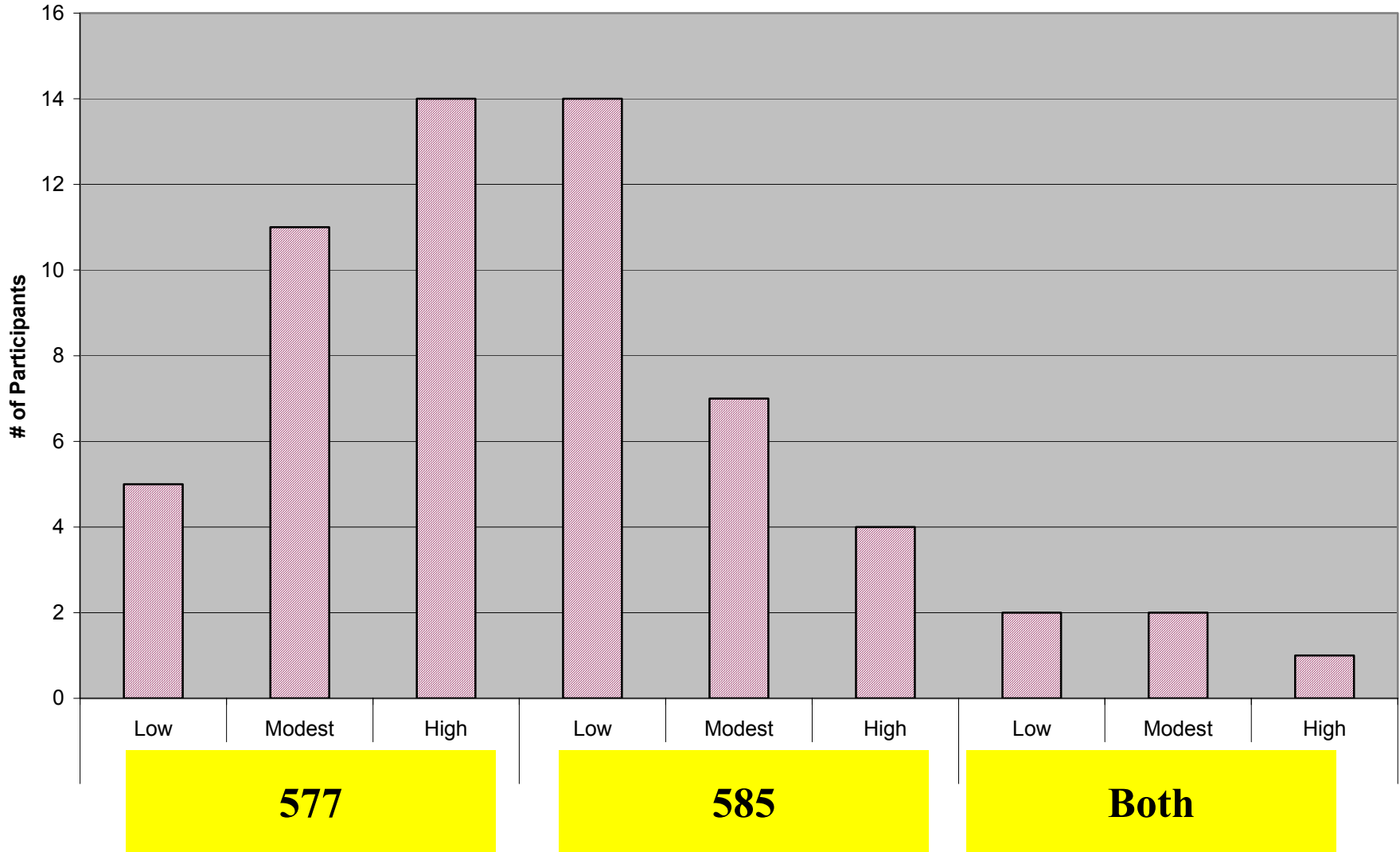
# EDRP Elasticities by Business (2-digit SIC: 0 - 39)



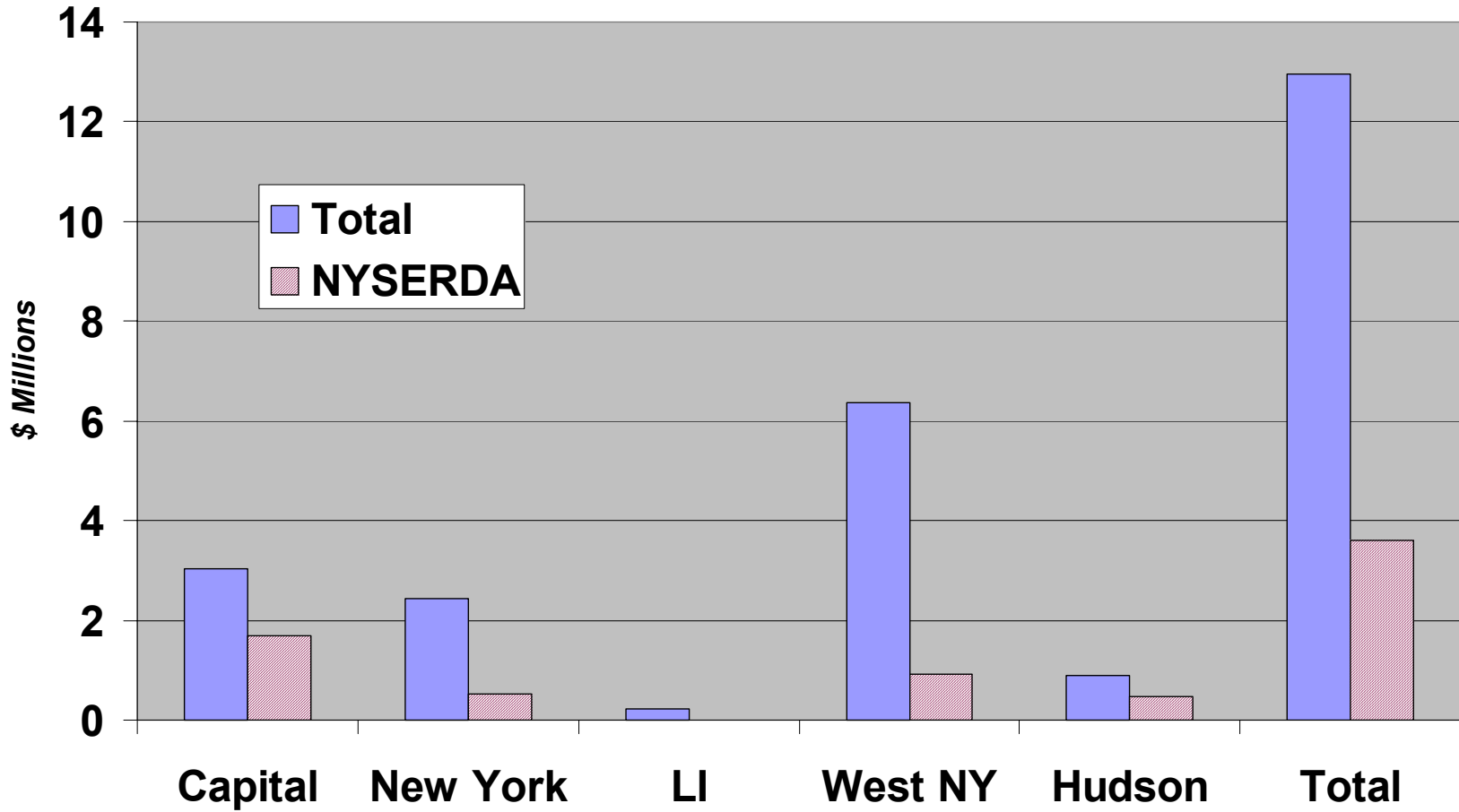
# EDRP Elasticities by Business (2-digit SIC: 49 - 99)



# EDRP Elasticities by PON



## EDRP Collateral Benefits



# Stated and Revealed Preferences

*Complete details for this section can be found in Chapter 3 of the NYISO Final Report*

# Revealed Preference Results

Firm Characteristic	Odds Ratio
Understand Notice	2.4
Peak-12-4pm	3.6
Production Shifts	2
In Other LSE Program	3.4
EDRP Info Very Useful	0.3
% of Correct Predictions	83
% of Incorrect Predictions	16

- Odds are more than 3 to 1 of participating in EDRP if:
  - ✓ Highest electricity usage in afternoon peak
  - ✓ In prior LSE sponsored LM Program
- Odds of participation 3 in 10 when EDRP information judged “Very Useful”
- An additional production shift doubles odds of participation

$$\text{Odds Ratio} = \frac{\text{Prob (Participation)}}{[1 - \text{Prob (Participation)}]}$$

$$\text{Probability} = \frac{\text{Odds}}{1 + \text{Odds}}$$

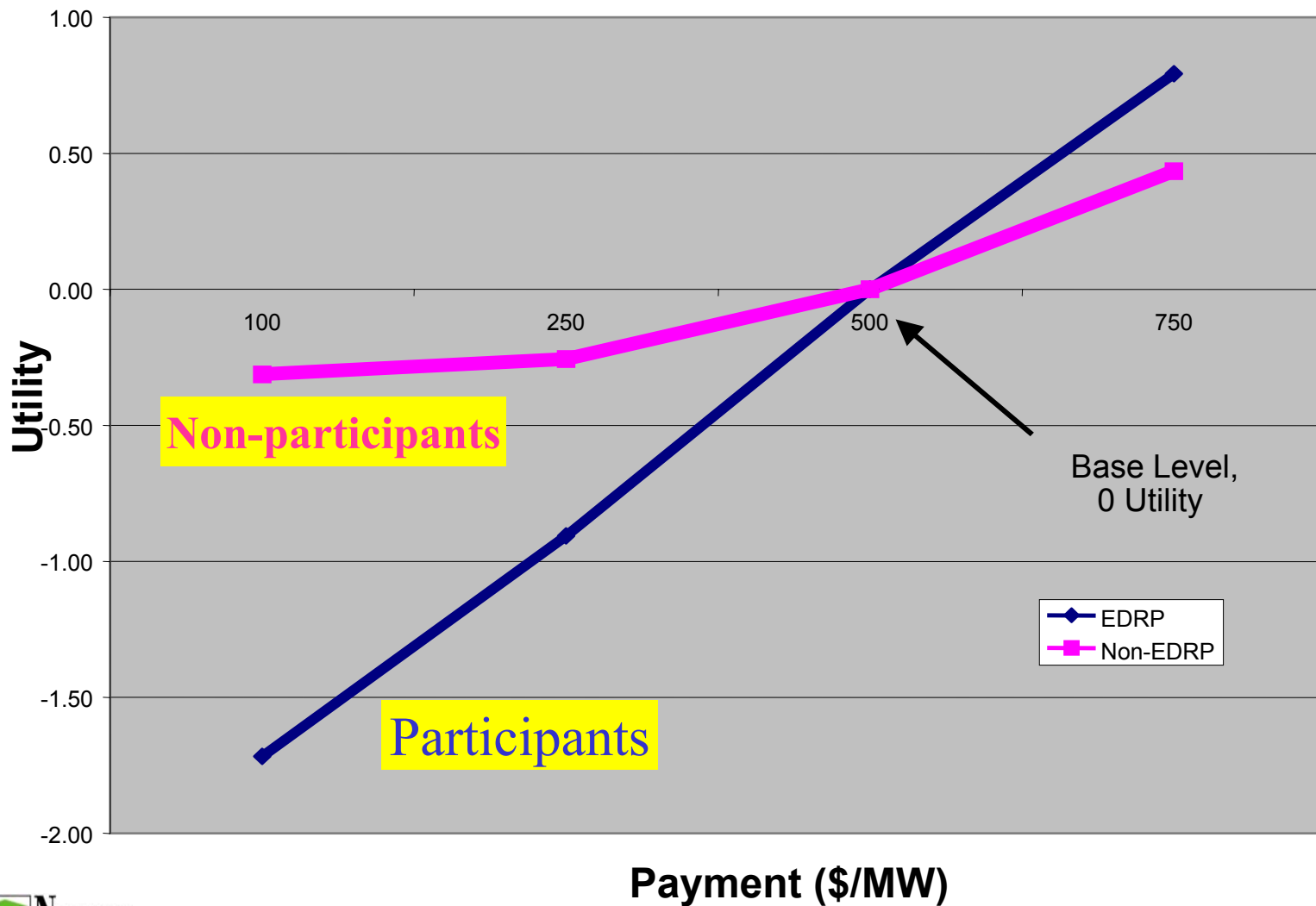
# Stated Preference Valuation

- Valuation is always made relative to a “Base” case.
- “Base” case resembles EDRP as closely as possible.

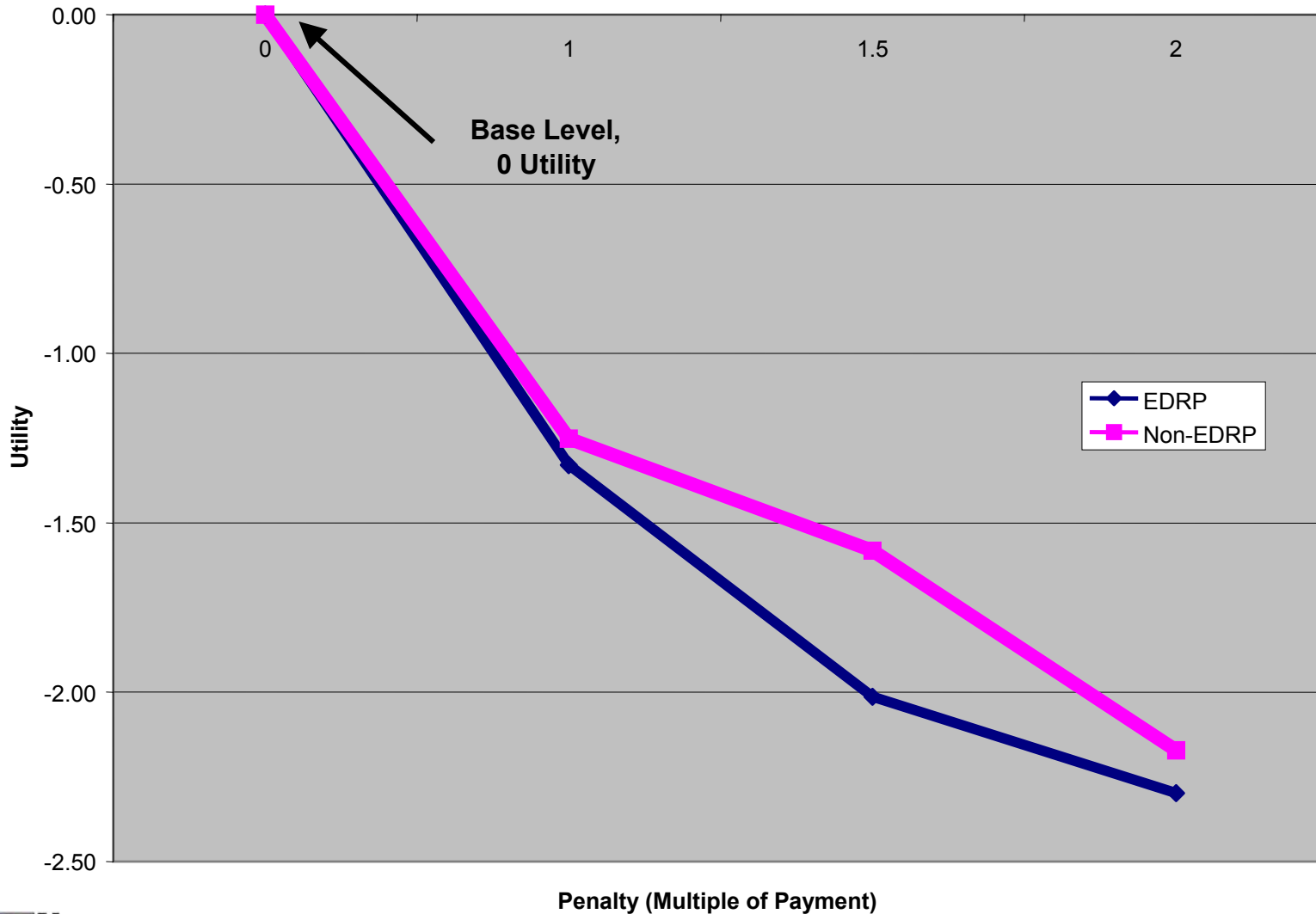
Base Case Program Features				
Payment	Penalty	Start Time	Notice	Duration
\$500	0	1300	2 Hrs	4 Hrs

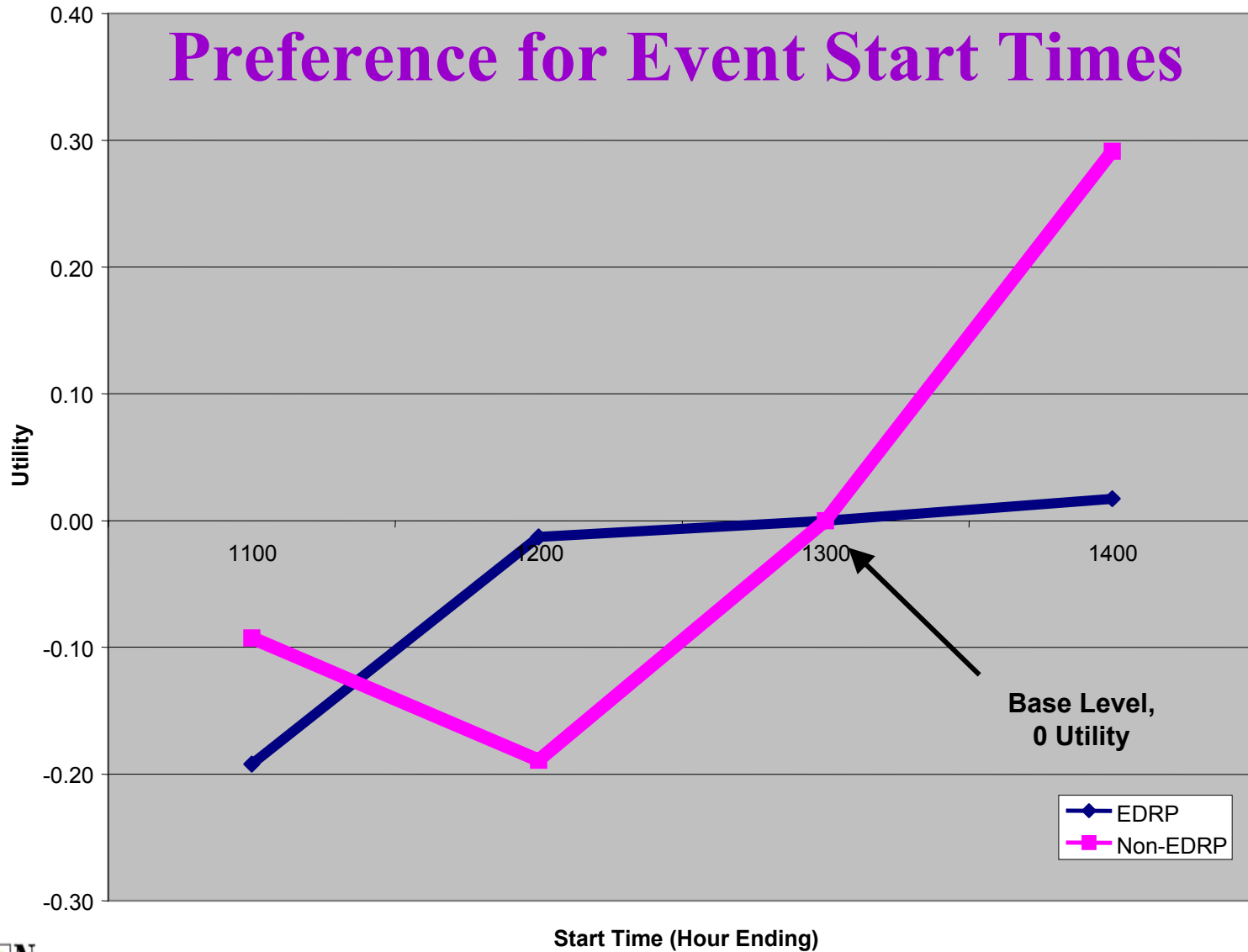


## Relative Utility for Payment Rate

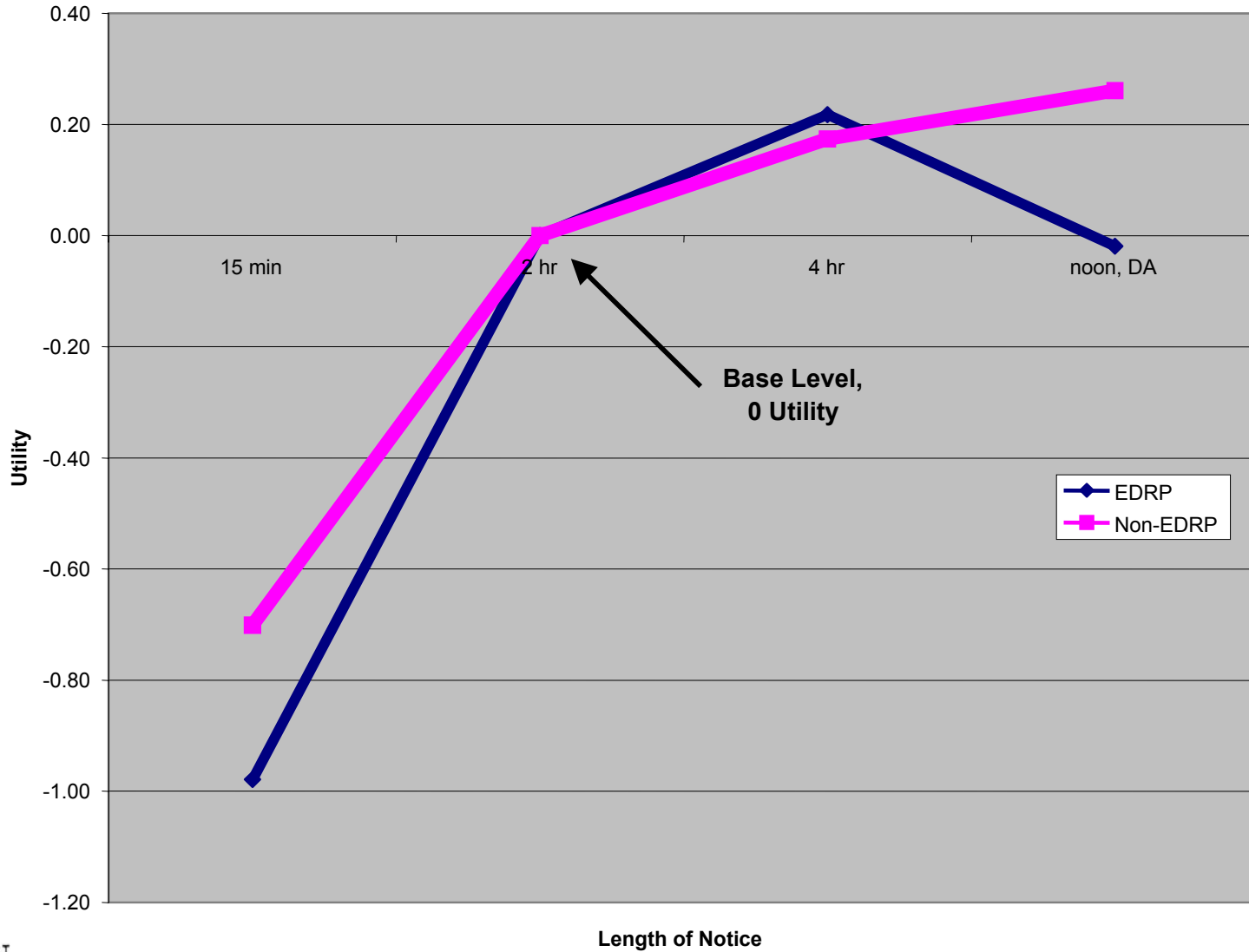


# Dis-utility of Penalty more pronounced for EDRP Participants





# Preference for Longer Notice Period



## EDRP Participants

## EDRP Non-Participants

	Odds relative to No Program	Odds relative to Base Program	Odds relative to No Program	Odds relative to Base Program
Base EDRP	3.5		.70	
\$750	7.7	2.2	1.4	1.5
Penalty = 50%	1.8	.50		
\$250	1.4	.40		
Double Notice and duration	5.5	1.6		
Start 1400			.90	1.4

# Stated Preference for RTP-type Program

		Non-participants	Participants
	<b>Base</b>	<b>Option NP4</b>	<b>Option NP4</b>
<b>Payment</b>	<b>\$500</b>	<b>\$500</b>	<b>\$250</b>
<b>Penalty</b>	<b>0</b>	<b>.1</b>	<b>.1</b>
<b>Start Time</b>	<b>1300</b>	<b>1300</b>	<b>1300</b>
<b>Notice</b>	<b>2 Hrs</b>	<b>DA</b>	<b>DA</b>
<b>Duration</b>	<b>4 Hrs</b>	<b>4 Hrs</b>	<b>4 Hrs</b>
<b>Total Utility</b>	<b>0.00</b>	<b>-.43</b>	<b>-1.05</b>
<b>Odds of Program vs Base</b>		<b>1.53</b>	<b>0.35</b>
<b>Odds of Program vs No Program</b>		<b>1.03</b>	<b>1.20</b>

# Program Population, Survey Sample and Customer Survey Results

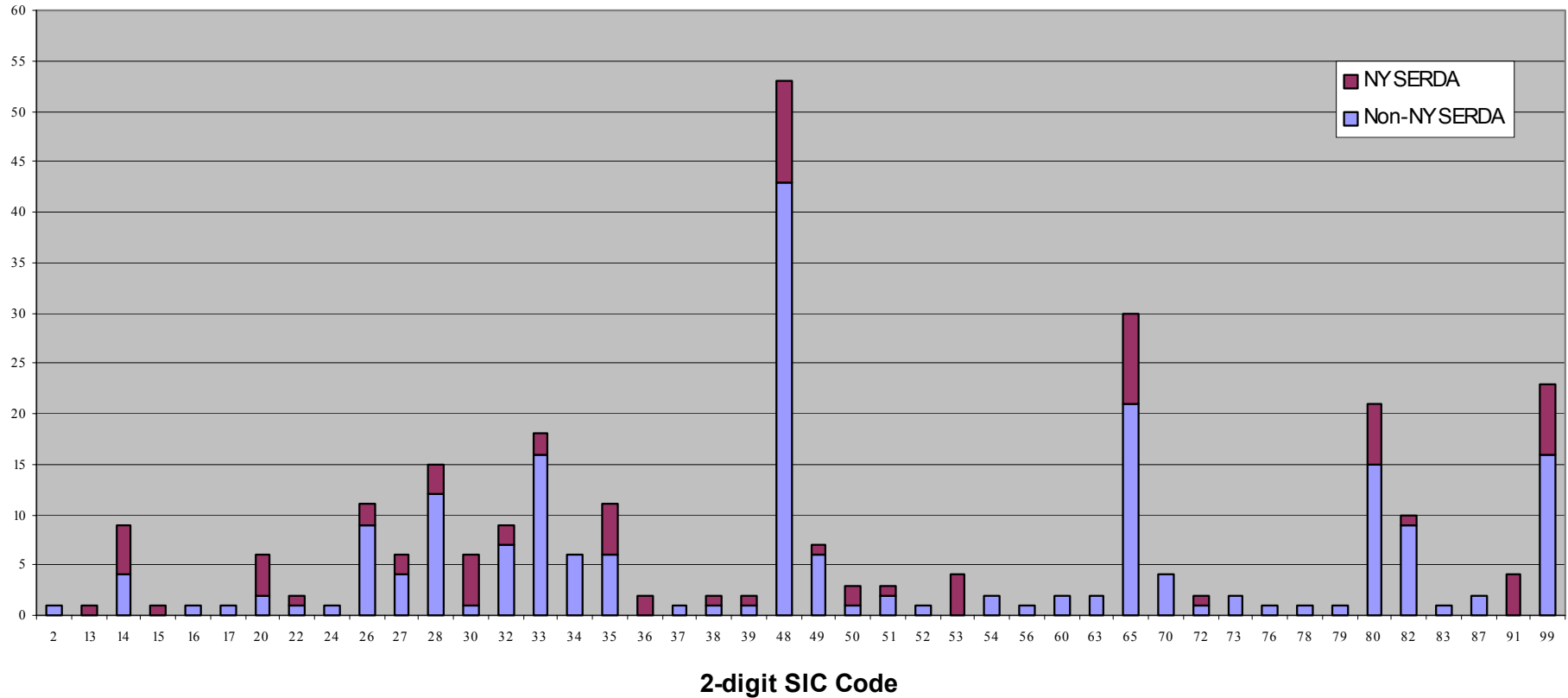
*Complete details for this section can be found in Chapter 4 of the NYISO Final Report*

# EDRP Program Population by Zone and PON

Zone	Subscribed Through					EDRP Participants also Participating in a NYSERDA PON			
	LSE	CSP	Other	Total	%	# 577	#585	Both	Total
	No.	No.	No.	No.		No.	No.	No.	No.
<b>Western New York*</b>									
A	33	1	4	38	13%	6	4	2	12
B	16	0	0	16	5%	3	0	5	8
C	29	0	2	31	11%	2	18	0	20
D	5	0	0	5	2%	1	2	0	3
E	23	0	0	23	8%	1	3	0	4
<b>Capital Zone</b>									
F	23	1	4	28	10%	4	2	0	6
<b>Hudson River Region**</b>									
G	13	2	0	15	5%	2	0	0	2
H	4	6	0	10	3%	1	5	0	6
I	15	5	0	20	7%	3	2	0	5
<b>New York City</b>									
J	48	20	0	68	23%	17	0	0	17
<b>Long Island</b>									
K	1	37	0	38	13%	0	0	0	0
<b>Totals</b>	<b>210</b>	<b>72</b>	<b>10</b>	<b>292</b>		<b>40</b>	<b>36</b>	<b>7</b>	<b>83</b>
<b>% of Total</b>	<b>72%</b>	<b>25%</b>	<b>3%</b>	<b>100%</b>		<b>14%</b>	<b>12%</b>	<b>2%</b>	<b>28%</b>



# EDRP Participants by SIC Code



*Detailed table with SIC Code descriptions on page 6-30*

# EDRP Participants by SIC Code-Table

SIC_2_digit	SIC Description	Non-NYSERDA	NYSERDA
2	Ag Production, Livestock, and Animal Specialties	1	0
13	Oil and Gas Extraction	0	1
14	Mining and Quarrying of Nonmetallic Minerals, Except Fuels	4	5
15	Building Construction General Contractors and Operative	0	1
16	Heavy Construction Other than Building Construction	1	0
17	Special Trade Contractors	1	0
20	Food and Kindred Products	2	4
22	Textile Mill Products	1	1
24	Lumber and Wood Products, Except Furniture	1	0
26	Paper and Allied Products	9	2
27	Printing, Publishing and Allied Industries	4	2
28	Chemicals and Allied Products	12	3
30	Rubber and Miscellaneous Plastic Products	1	5
32	Stone, Clay, and Glass Products	7	2
33	Primary Metal Industries	16	2
34	Fabricated Metal Products	6	0
35	Industrial Machinery and Equipment	6	5
36	Electronic and Other Equipment	0	2
37	Transportation Equipment	1	0
38	Instruments and Related Products	1	1
39	Miscellaneous Manufacturing	1	1
48	Communication	43	10
49	Electric, Gas, and Sanitary Services	6	1
50	Wholesale Trade - Durable Goods	1	2
51	Wholesale Trade - Nondurable Goods	2	1
52	Building Materials and Garden Supplies	1	0
53	General Merchandise Stores	0	4
54	Food Stores	2	0
56	Apparel and Accessory Stores	1	0
60	Depository Institutions	2	0
63	Insurance Carriers	2	0
65	Real Estate	21	9
70	Hotels and Other Lodging Places	4	0
72	Personal Services	1	1
73	Business Services	2	0
76	Miscellaneous Repair Services	1	0
78	Motion Pictures	1	0
79	Amusement and Recreation Services	1	0
80	Health Services	15	6
82	Educational Services	9	1
83	Social Services	1	0
87	Engineering and Management Services	2	0
91	Executive, Legislative, and General	0	4
99	Nonclassifiable Establishments	16	7
		209	83

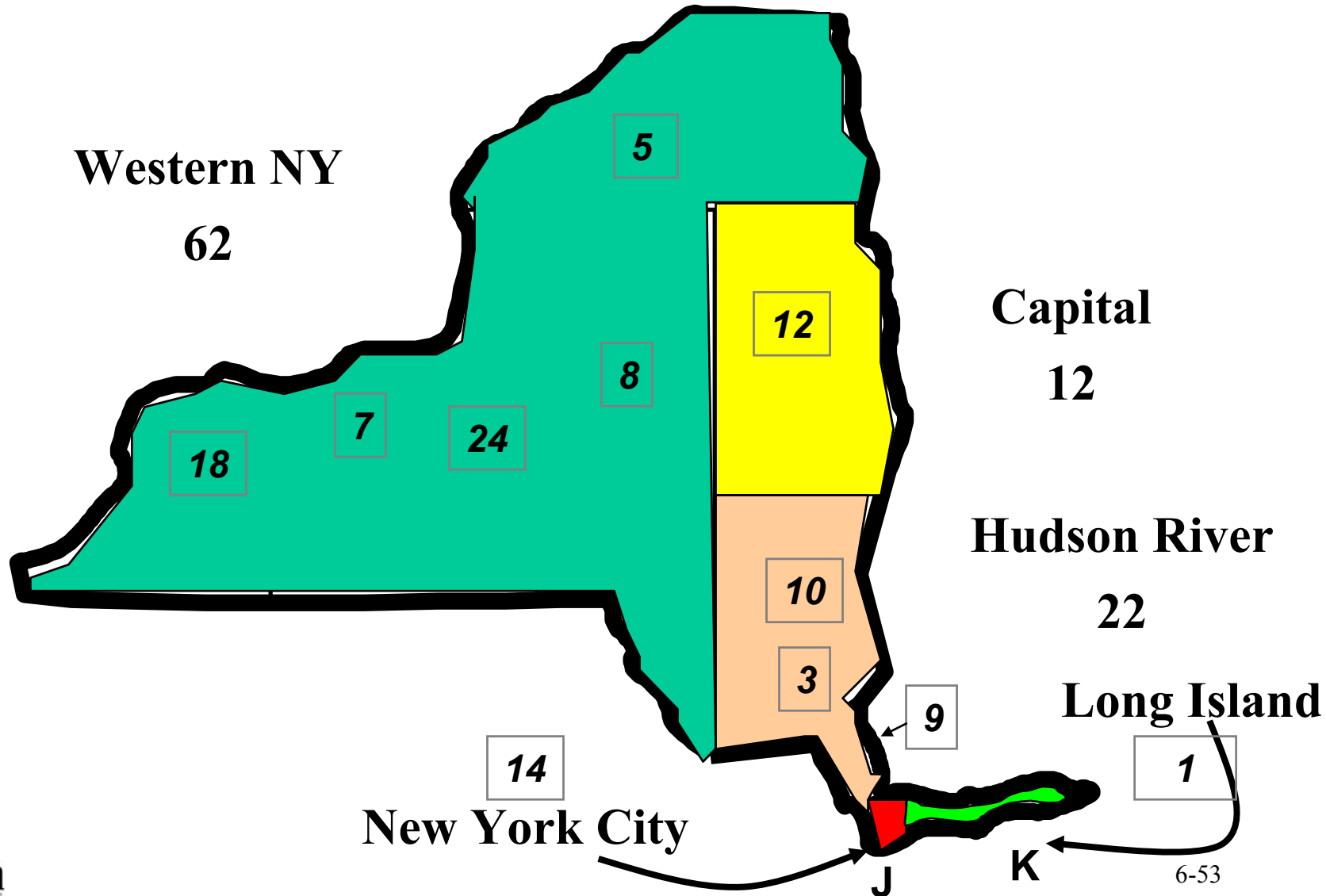
# Customer Survey Administration

- Two-part survey: program acceptance and choice (conjoint)
- Hard copy mailed to sample with option to complete online
- Follow-ups with postcard, telephone and e-mail
- Prizes offered as incentives to complete survey

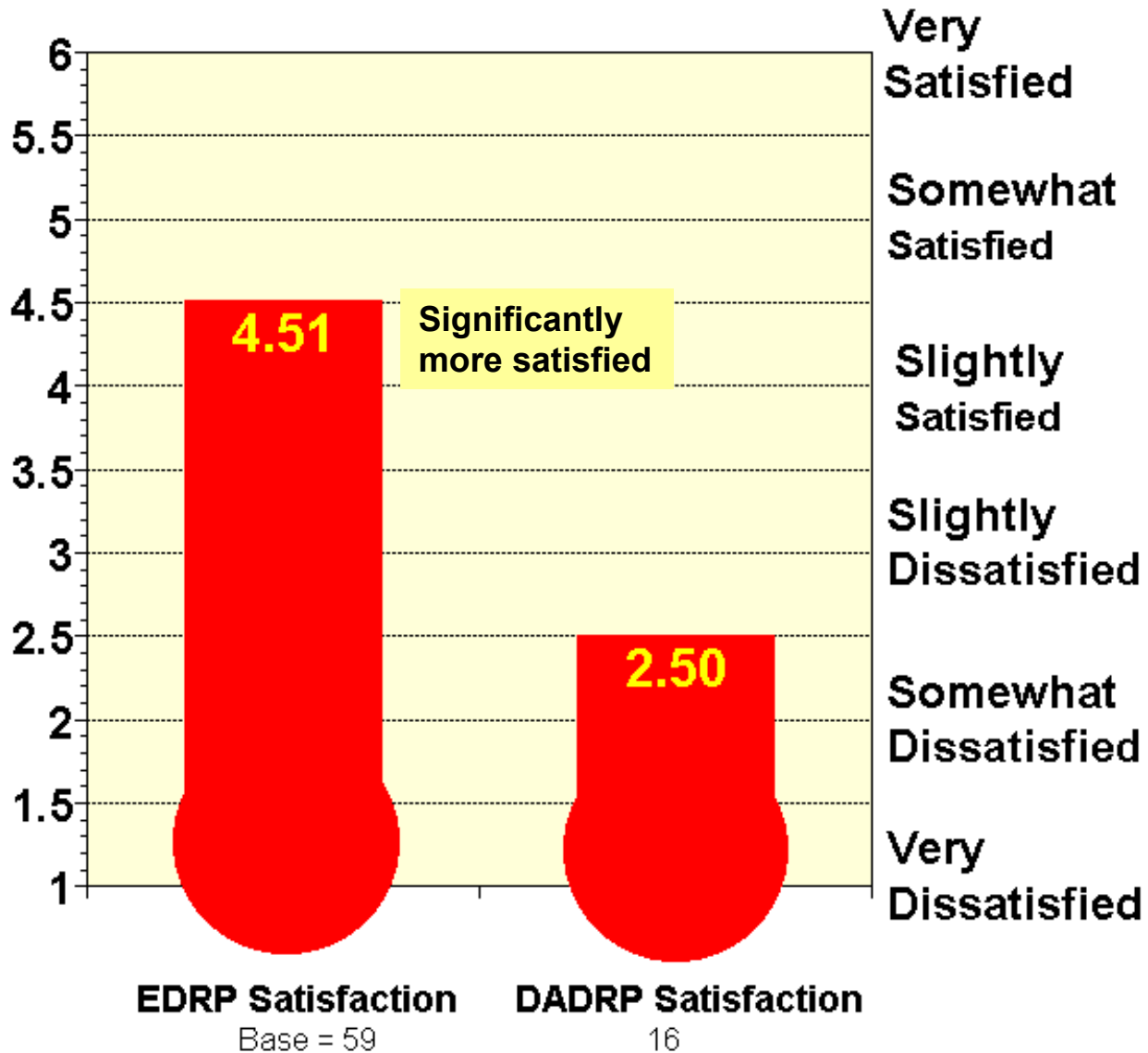
# Customer Survey Sample

	Participants			Informed Non-Participants			Total	
	LSEs	CSPs	Other	LSEs	CSPs	Other	P	INP
<b>Available Population</b>	<b>140</b>	<b>142</b>	<b>10</b>	<b>3293</b>	<b>?</b>	<b>477</b>	<b>292</b>	<b>3770</b>
<b>Surveys Sent</b>	<b>140</b>	<b>2 (51)</b>	<b>10</b>	<b>478</b>	<b>0</b>	<b>48</b>	<b>152</b>	<b>526</b>
<b>Completed Surveys Received</b>	<b>44</b>	<b>2 (51)</b>	<b>7</b>	<b>49</b>	<b>0</b>	<b>9</b>	<b>53</b>	<b>58</b>
<b>Total: Surveys Sent</b>							<b>631</b>	
<b>Total: Survey Responses</b>							<b>111</b> (63 paper + 48 web)	

# Survey Response by “SuperZone”



# Overall Satisfaction of EDRP & DADRP

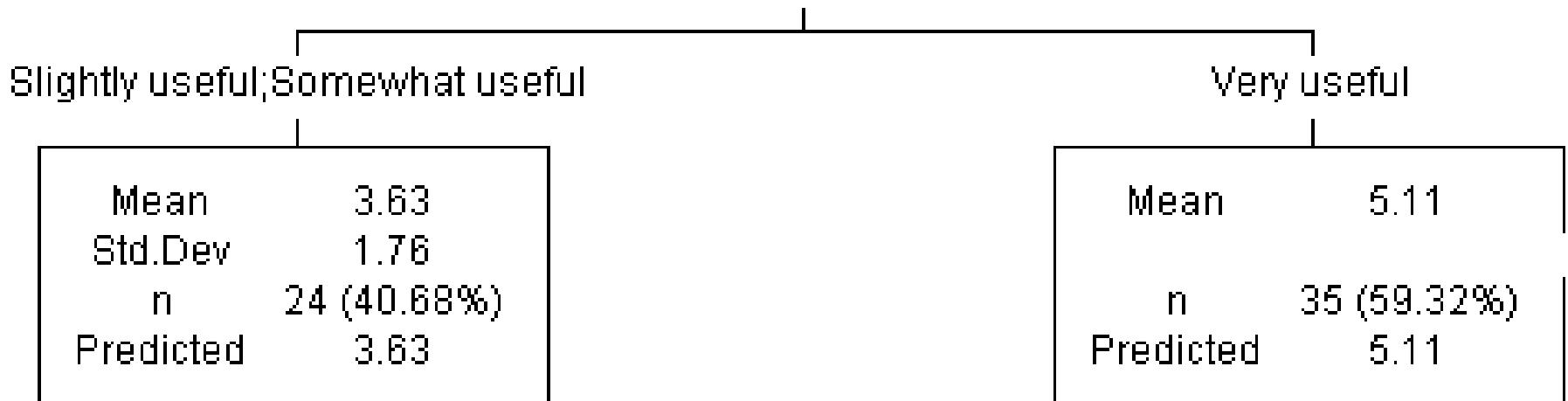


# Key drivers of EDRP Satisfaction

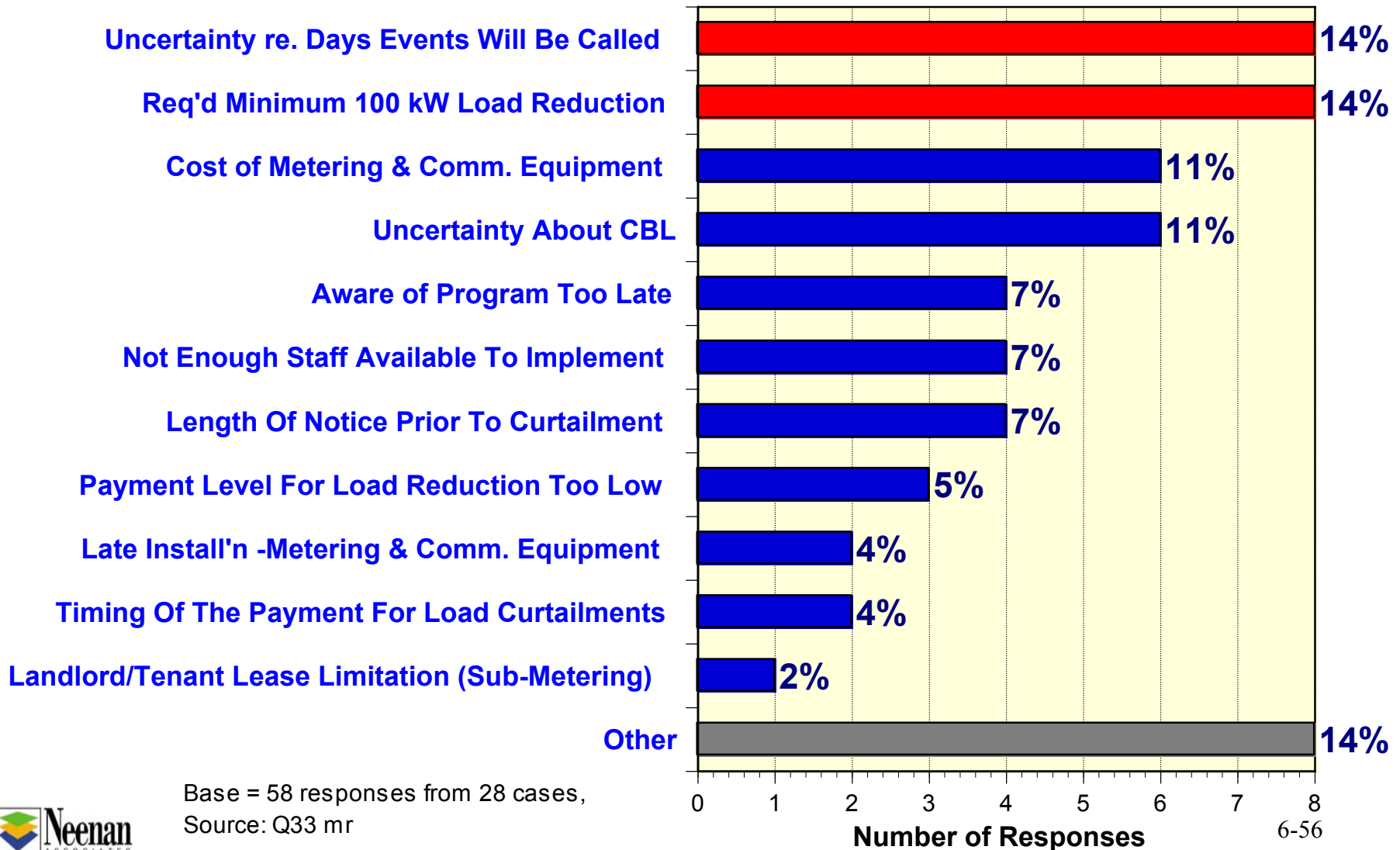
## Q29a. EDRP Satisfaction Overall

Mean	4.51
Std.Dev	1.51
n	59 (100.00%)
Predicted	4.51

## Q12. Information Usefulness for Understanding EDRP



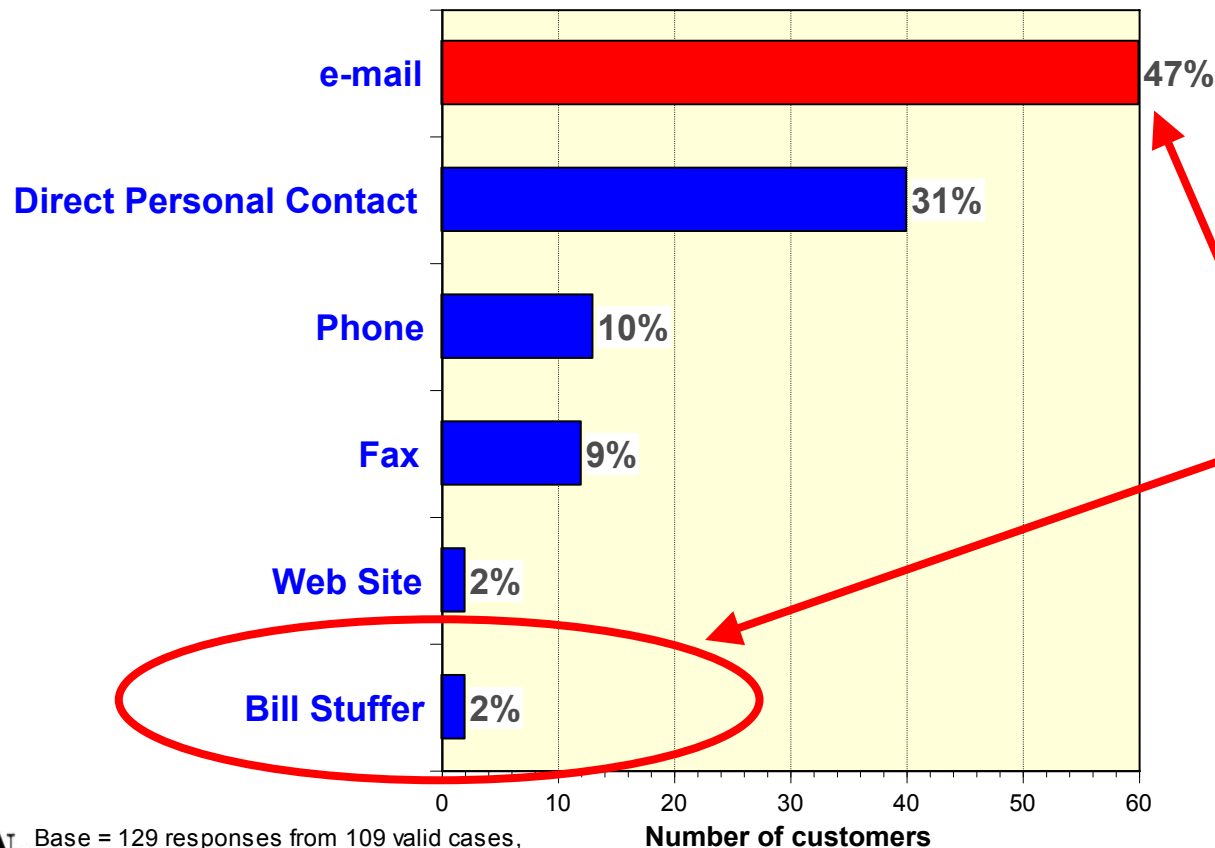
# Reasons for Not Signing Up for EDRP





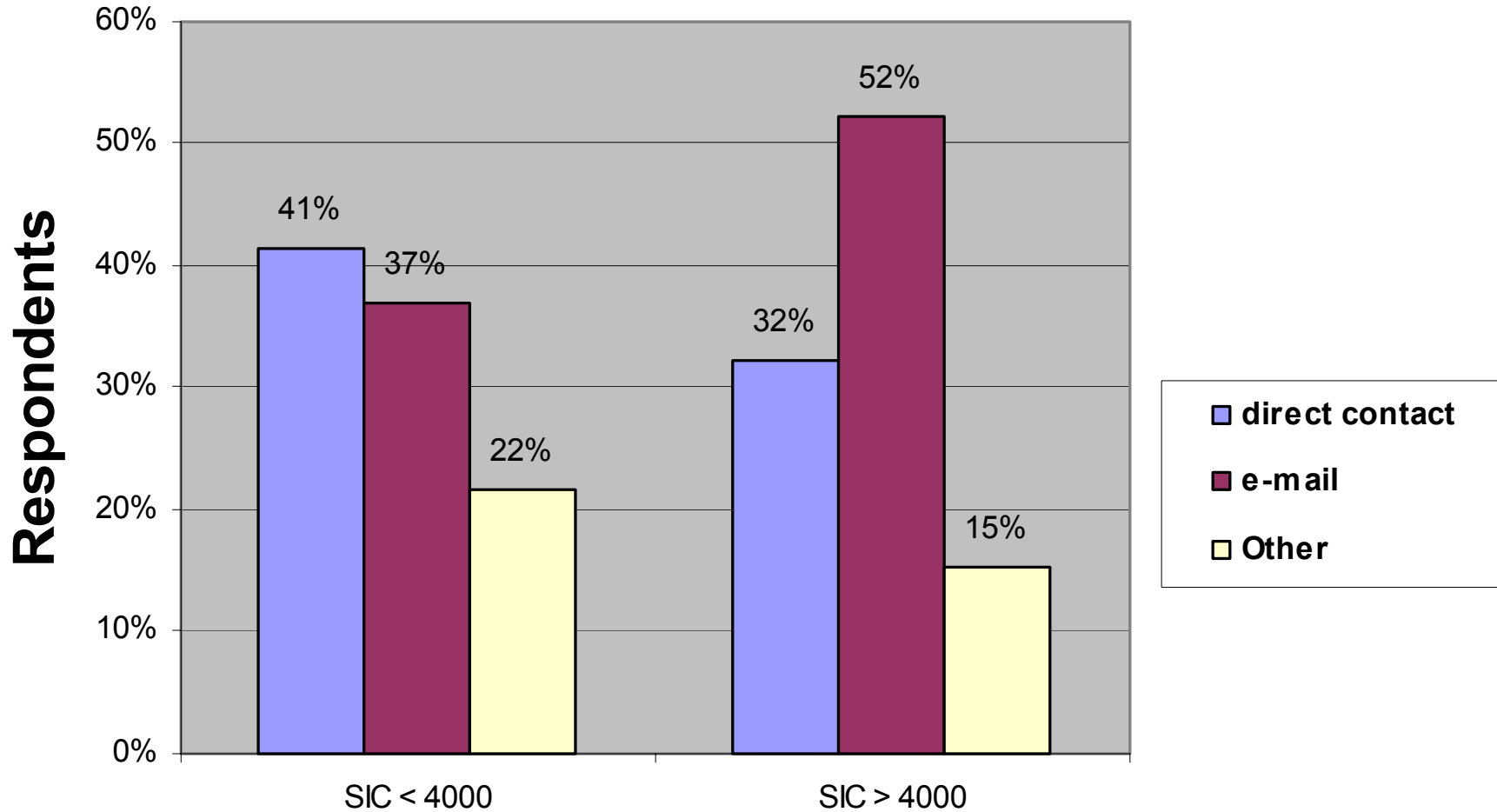
Hypothesis 5: The most effective way to get **information** on PRL programs to customers is through a **bill stuffer** or other direct communication.

### Most Effective Communication of DRPs

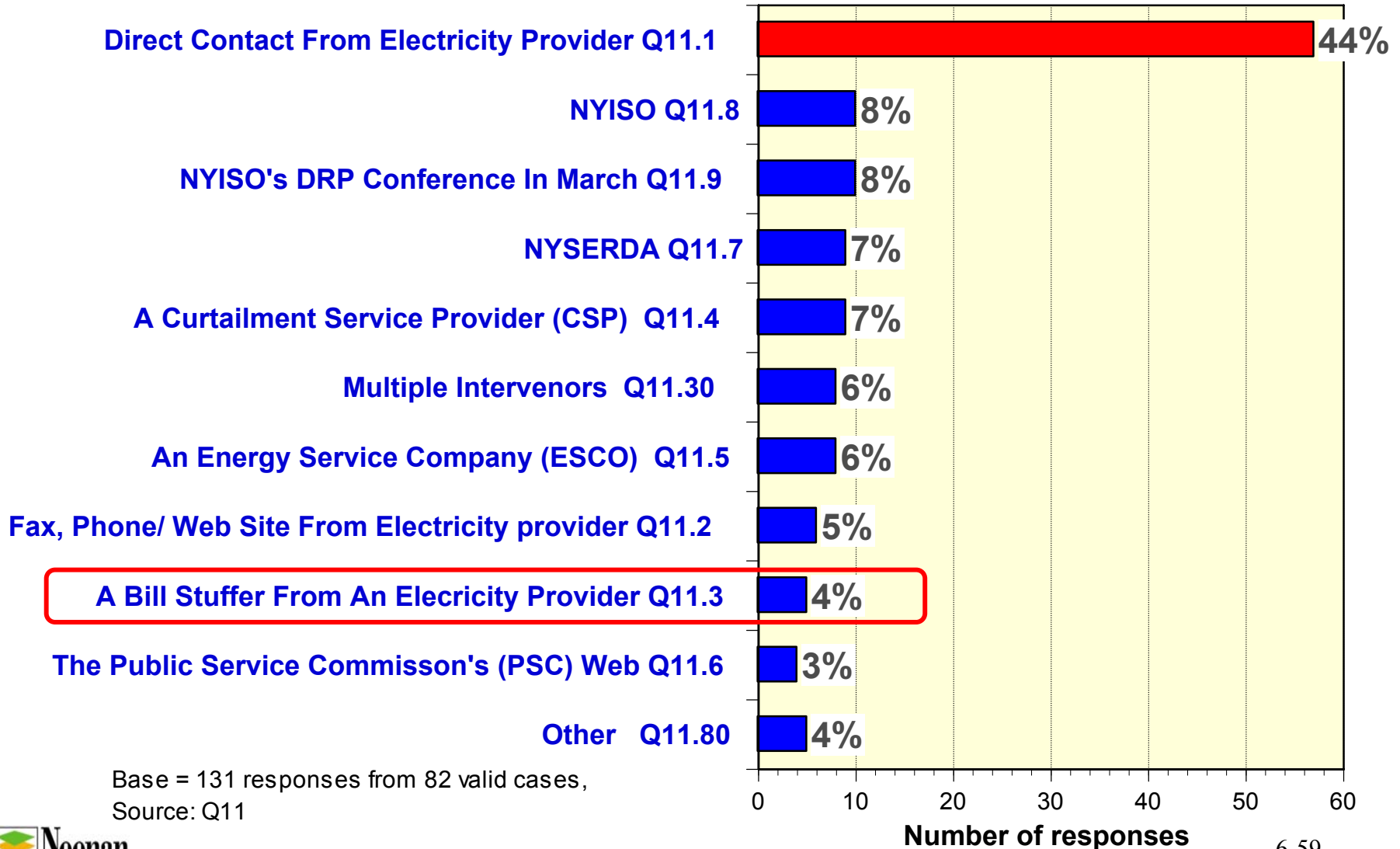


Hypothesis rejected

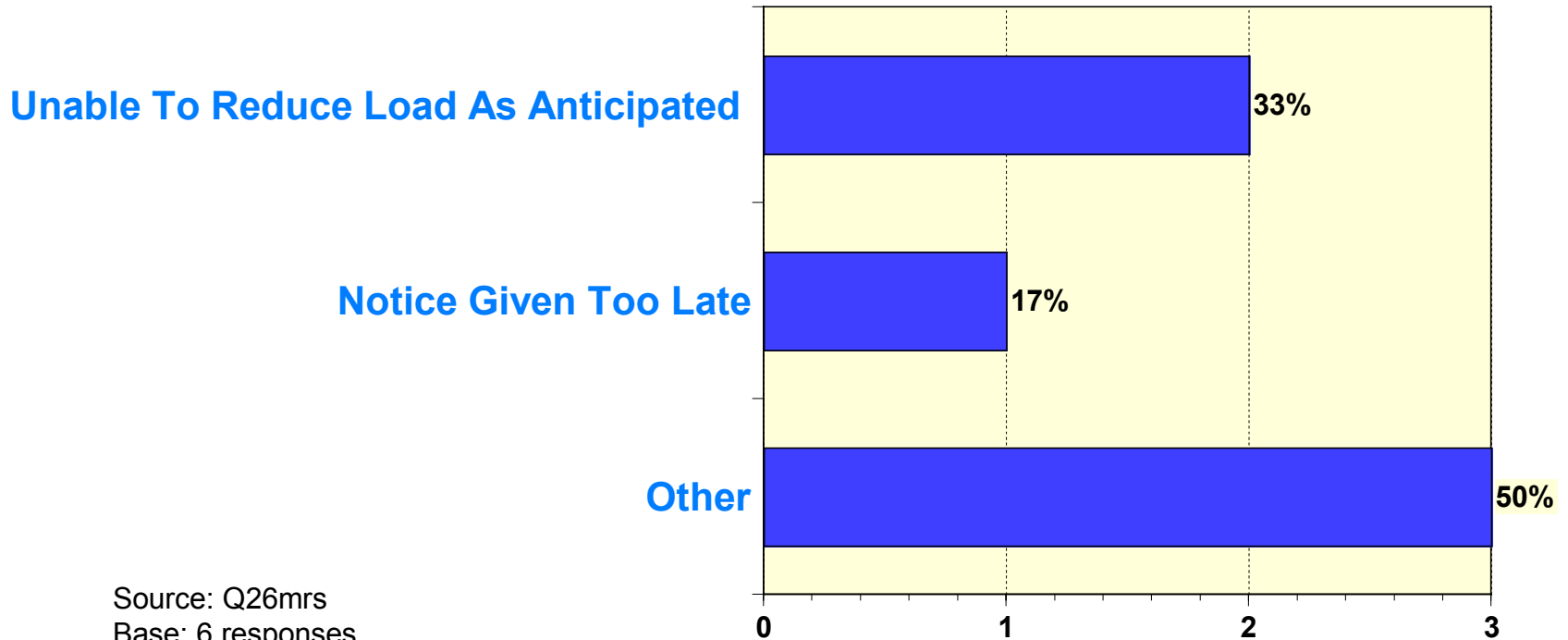
## Survey Respondents Preferred Method of Contact Total 111 Respondents



# Sources of Information About EDRP

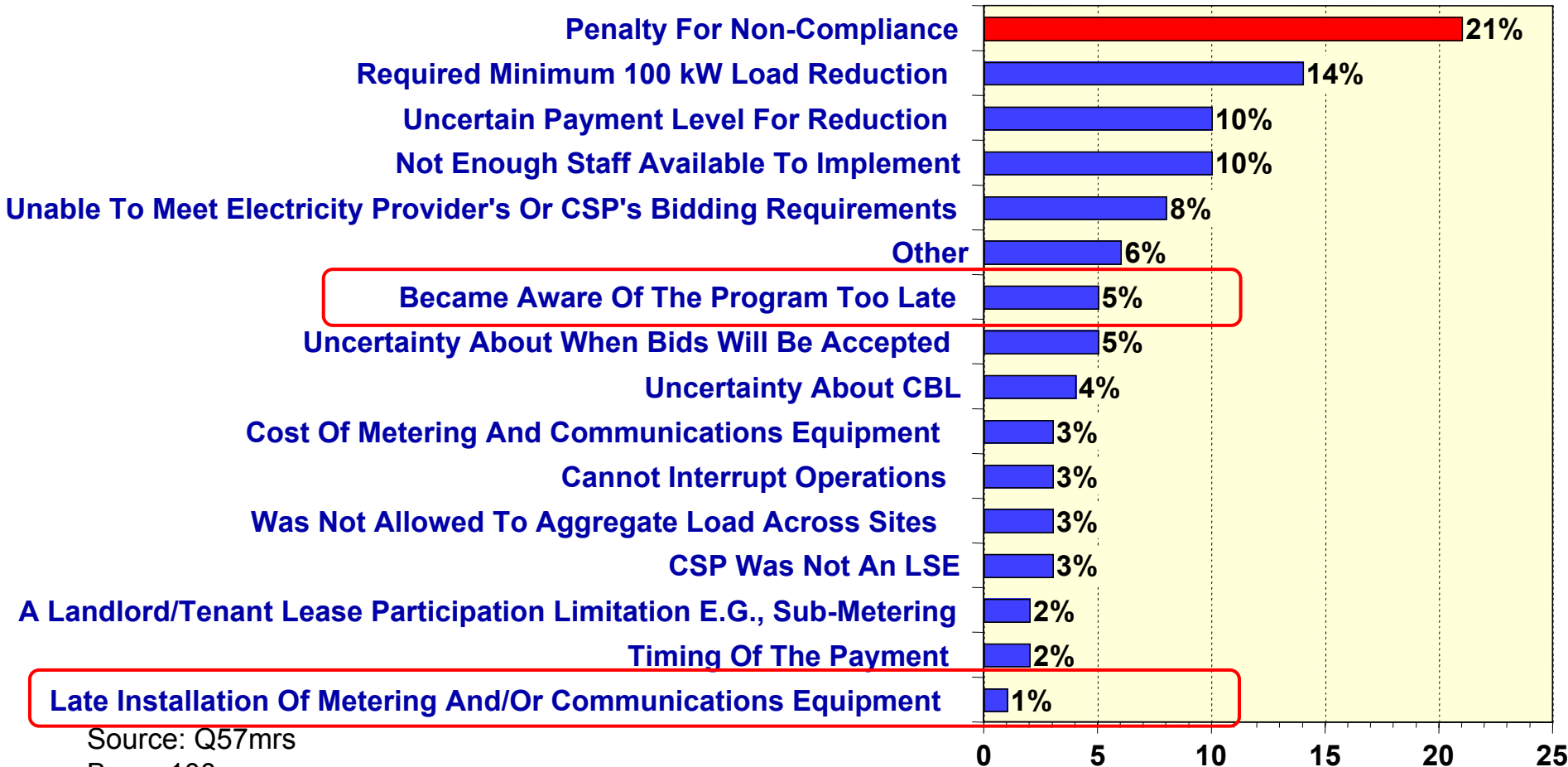


## Please specify the reasons you did not participate in the EDRP emergency events called on August 7th- 10th, 2001?



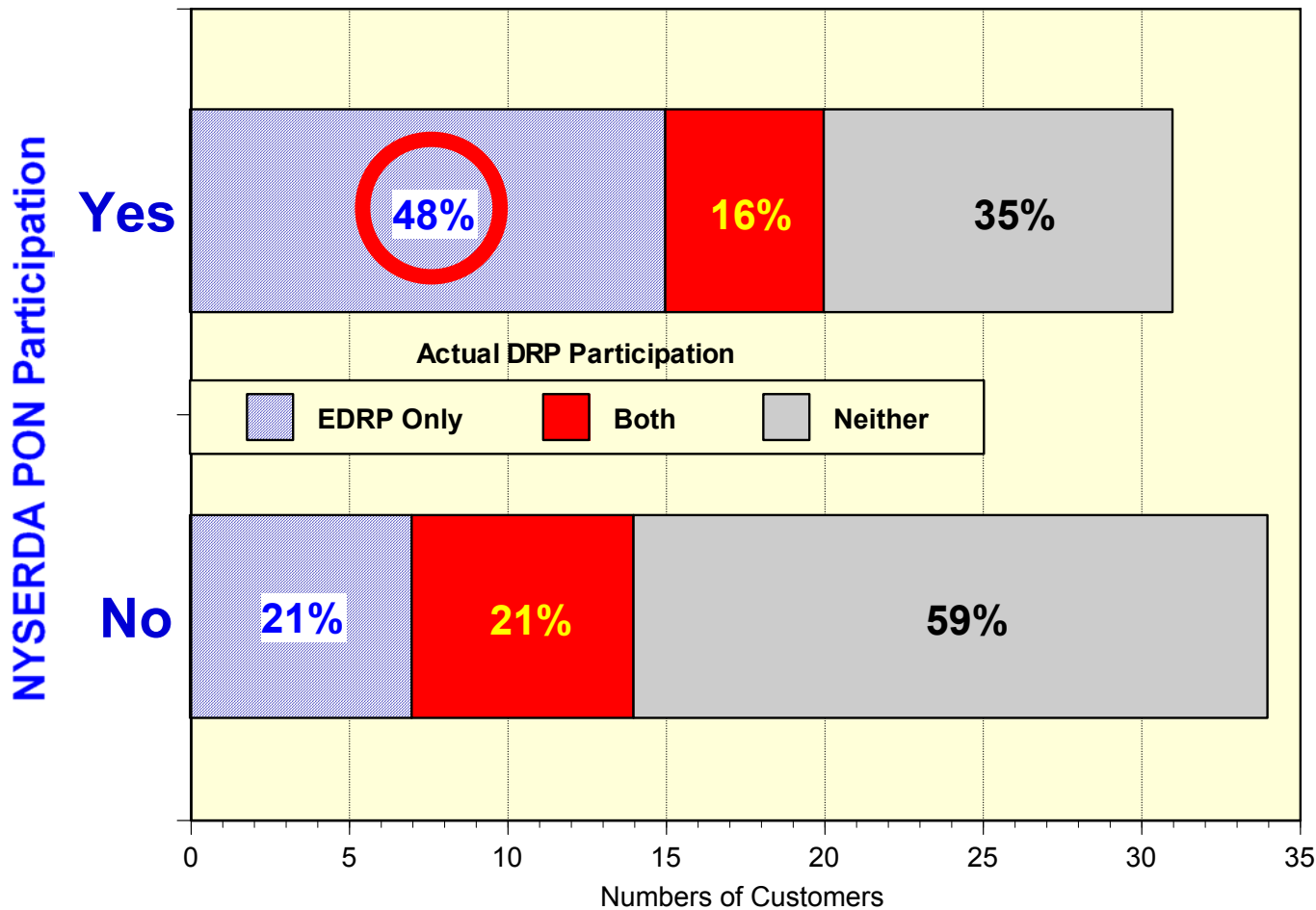
Source: Q26mrs  
Base: 6 responses

## Factors that contributed directly to decision not to sign up to the DADRP



Source: Q57mrs  
 Base: 100 responses

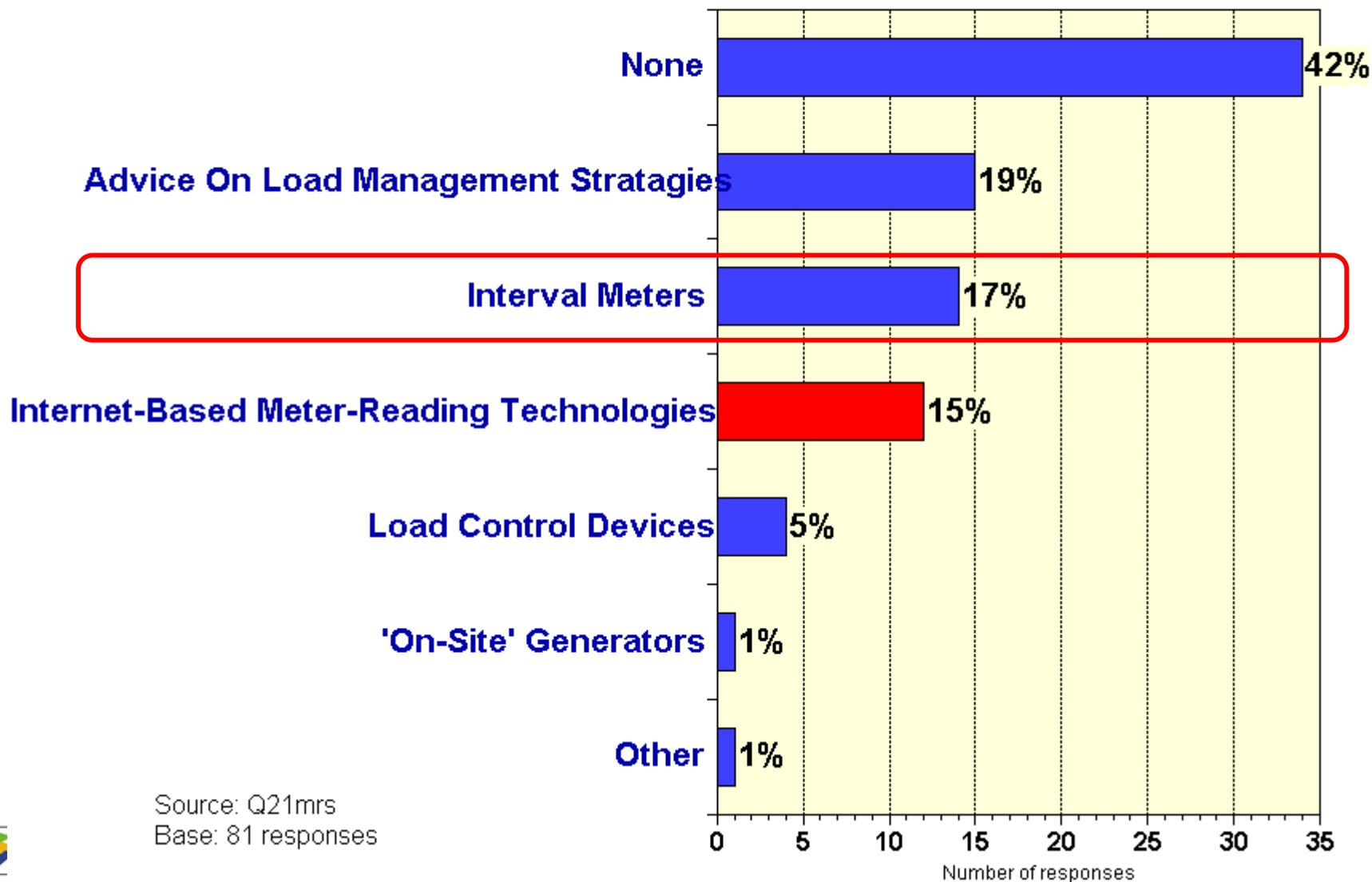
# NYSERDA PON 585 & 577 Participation and Actual DRP Participation



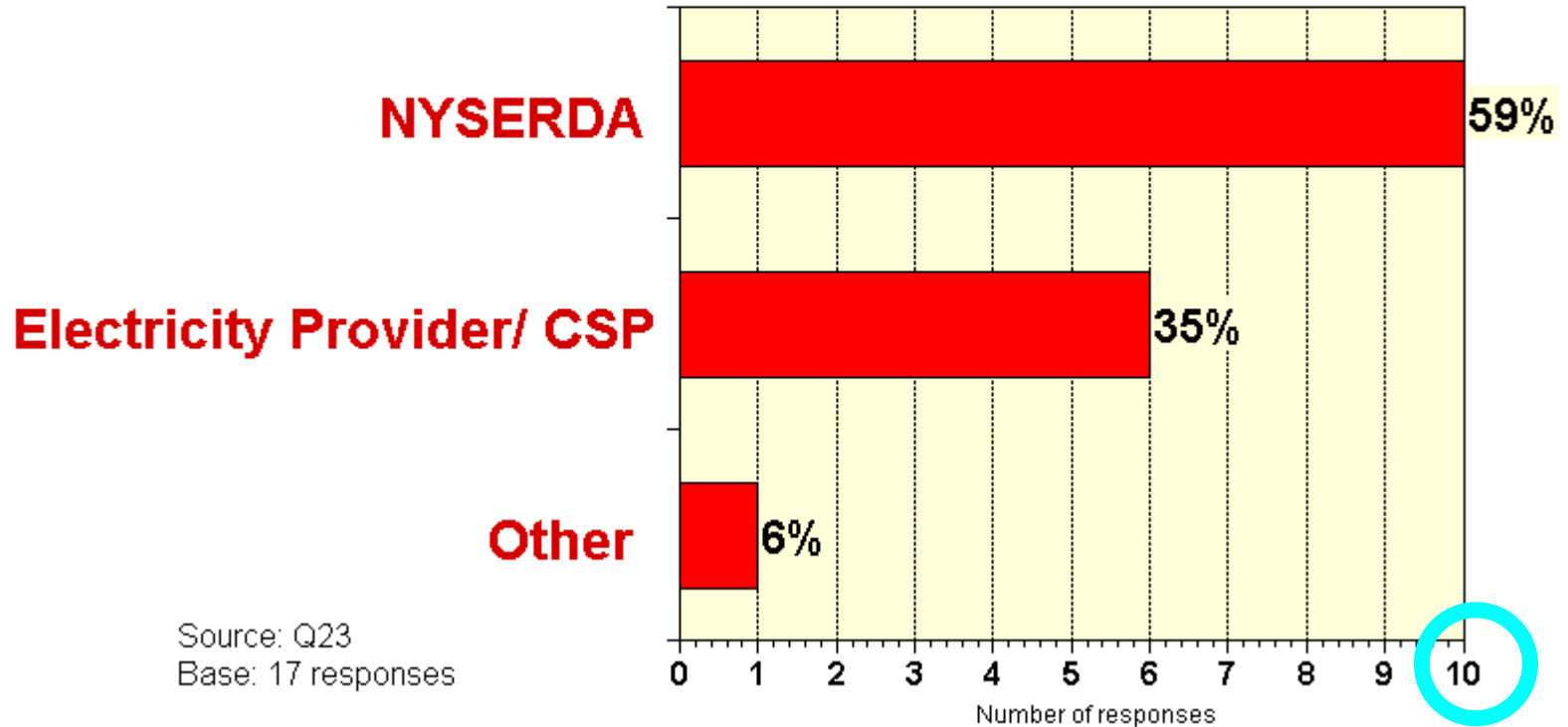
NYSERDA PONs participants were significantly more likely to have actually participated in the NYISO DRPs.

Base = 65, Source: Q7, NYISO Combined participation

## Equipment installed specifically to participate in EDRP



## Financial Assistance Source to Purchase Equipment for EDRP





# Hypothesis 12: Participants who received NYSERDA funding for enabling technology achieved a higher level of performance.

**Hypothesis rejected**

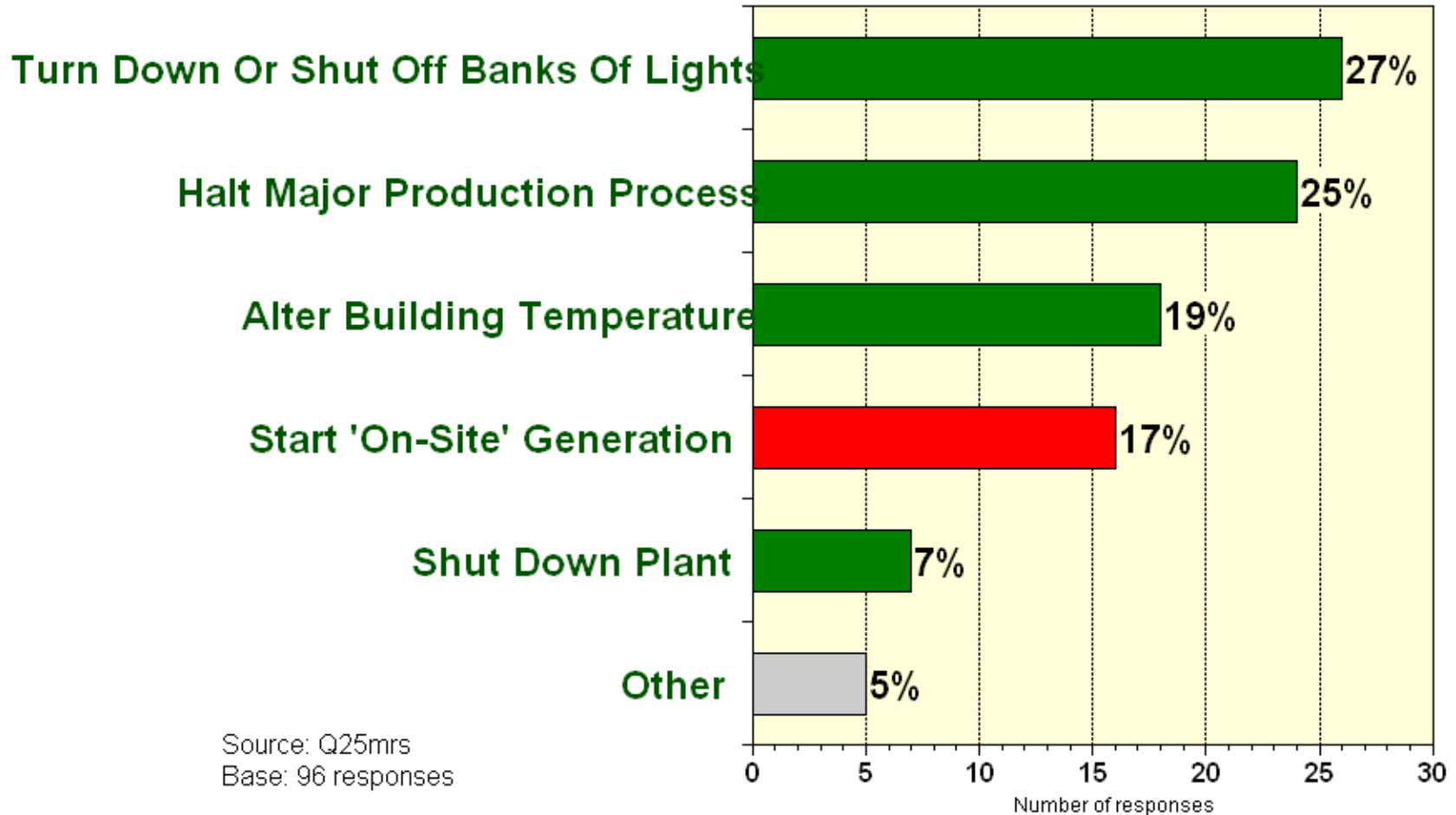
## Results:

- **1.23 MW per hour** from those who received NYSERDA funding (average of 59 NYSERDA performing participants)
- **1.55 MW per hour** from those who did not receive NYSERDA funding (average of 154 performing non-NYSERDA participants)

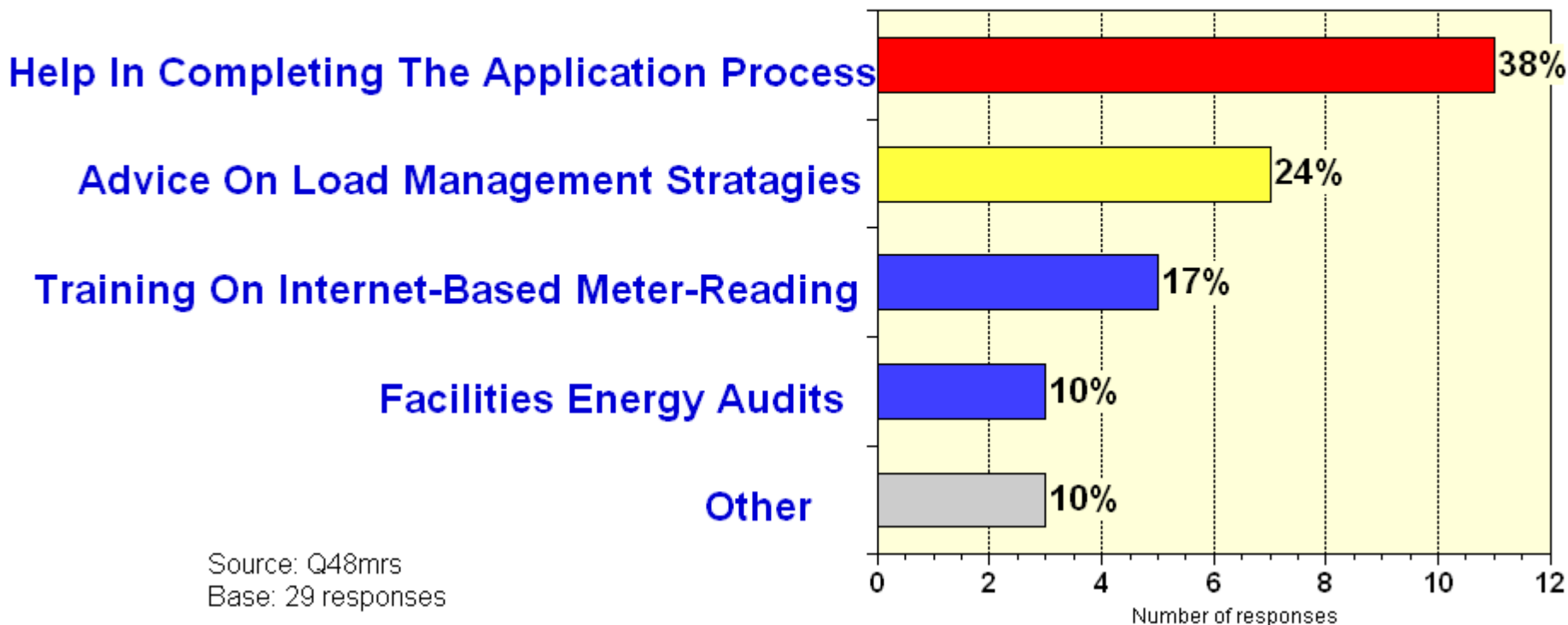
NOTE: Many NYSERDA participants did not have projects completed in time for the August, 2001 events.

- Not enough respondents to analyze for DADRP

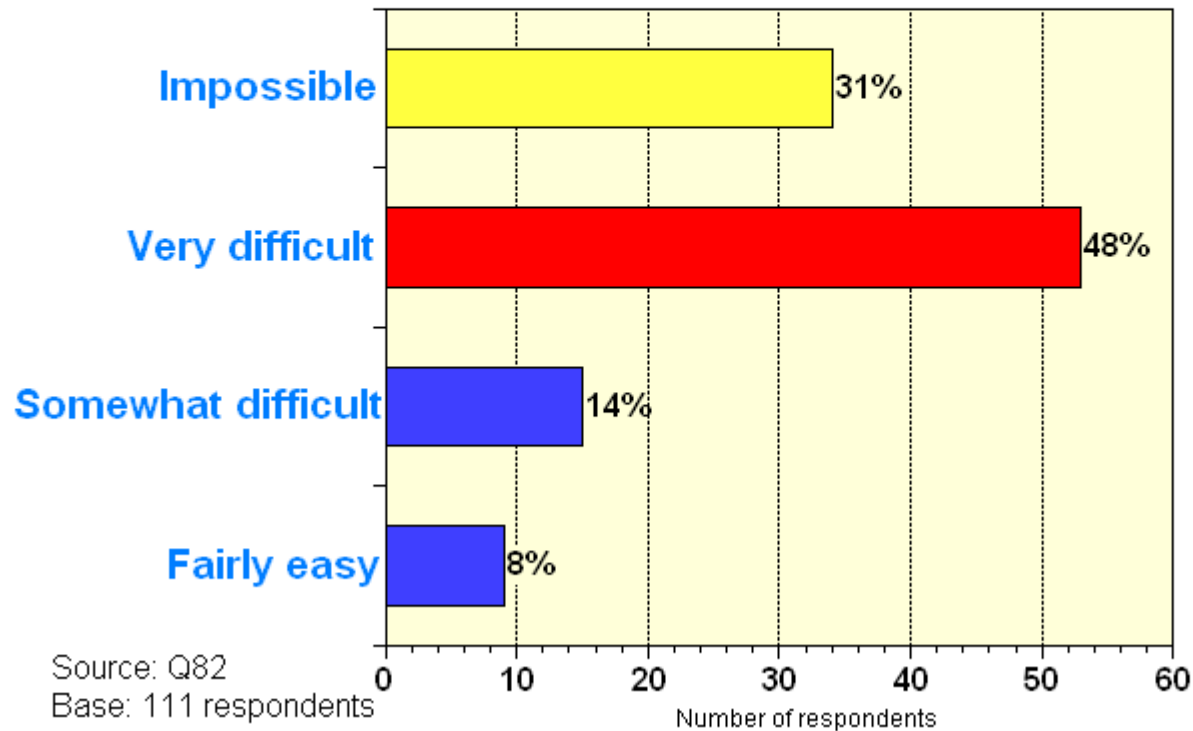
## Compliance actions undertaken during the EDRP emergency events on August 7th- 10th, 2001?



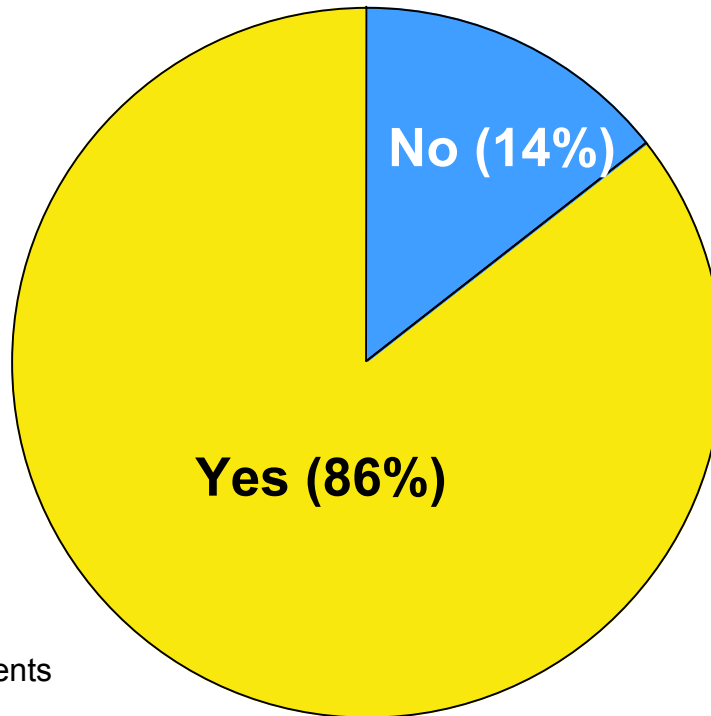
## Assistance received in facilitating participation in the DADRP



## Q82. How easy would it be to shift part of your electricity usage from the period of highest use indicated in the previous question to a period of lower use?



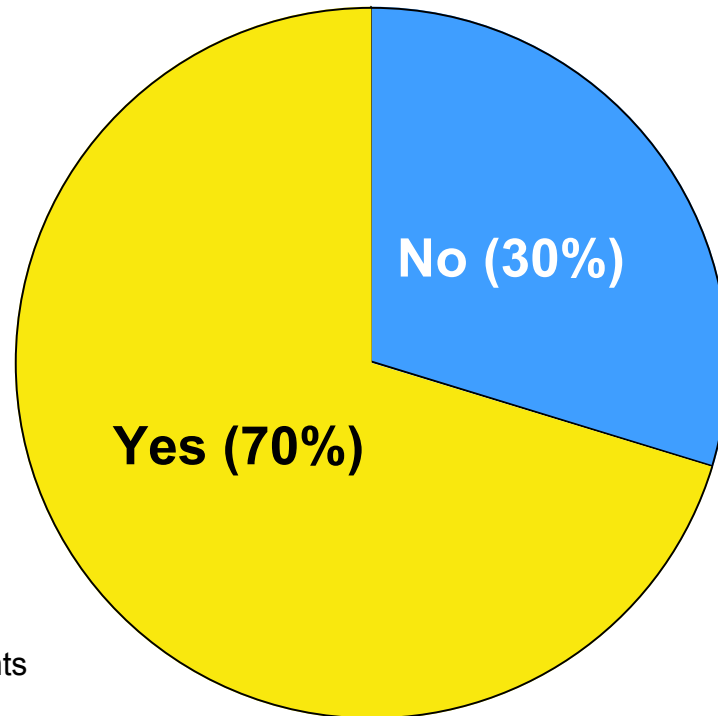
### Q3. Have you heard of the New York State Energy Research & Authority(NYSERDA)?



**A very high level of name recognition**

Source: Q3  
Base: 111 respondents

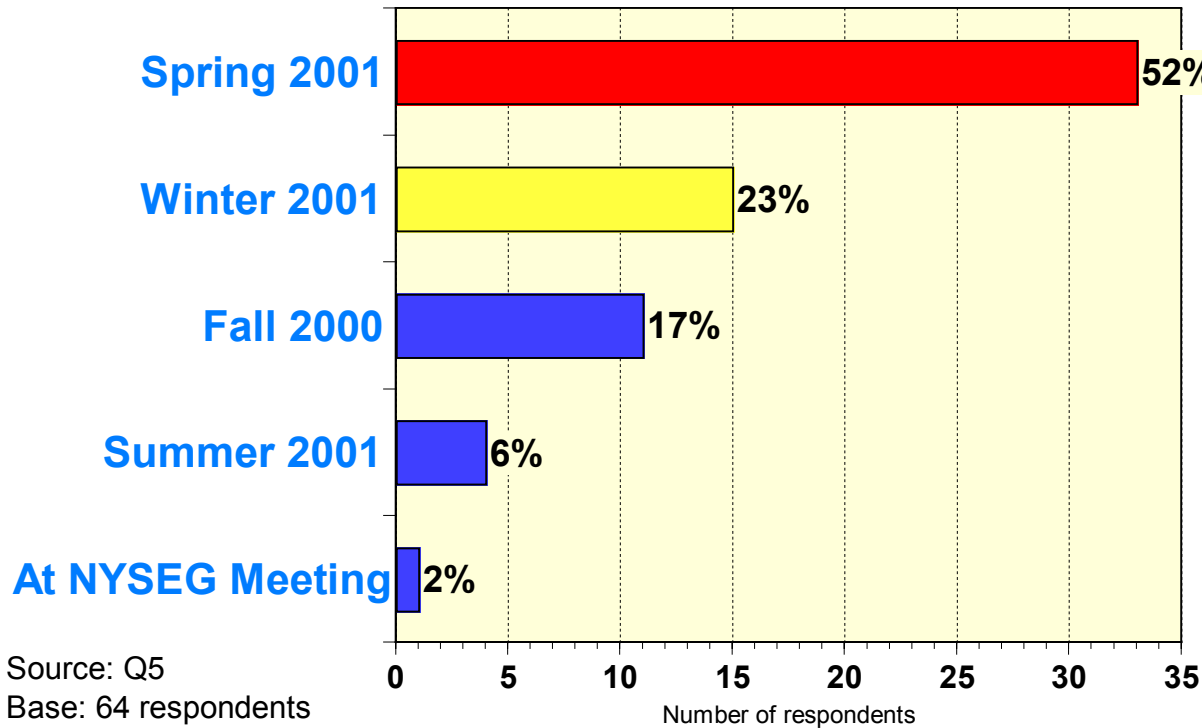
**Q4. Are you aware of either of the following  
NYSERDA Program Opportunity Notices (PON), i.e.  
PON 585 or PON 577?**



**A slightly  
lower level of  
PRL enabling  
program  
recognition**

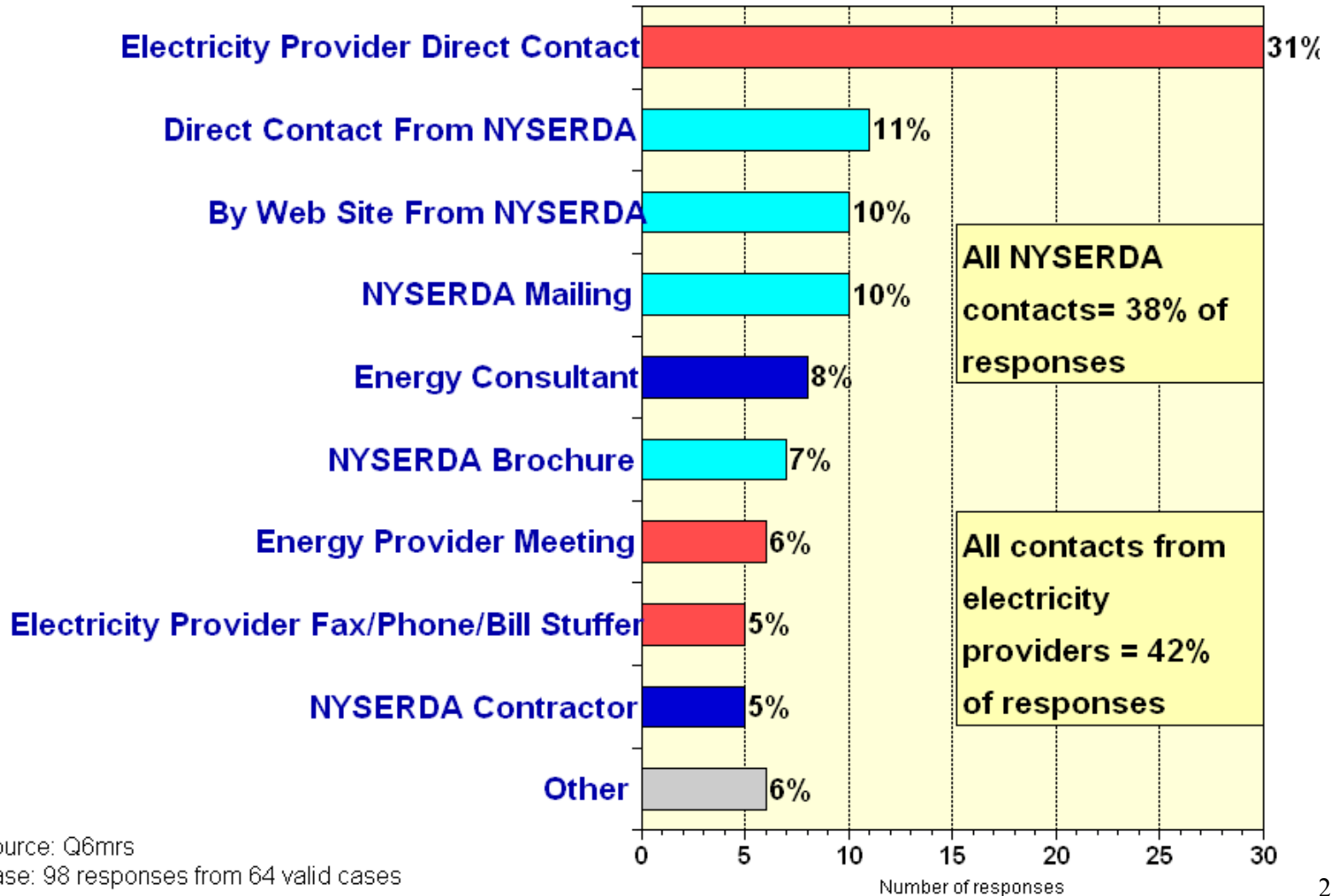
Source: Q4  
Base: 91 respondents

## Q5. When did you become aware of PON 585 or PON 577?



The high level of awareness in the Spring may have hampered participation in the PONS.

## Information sources for NYSERDA's PON 585 or PON 577?

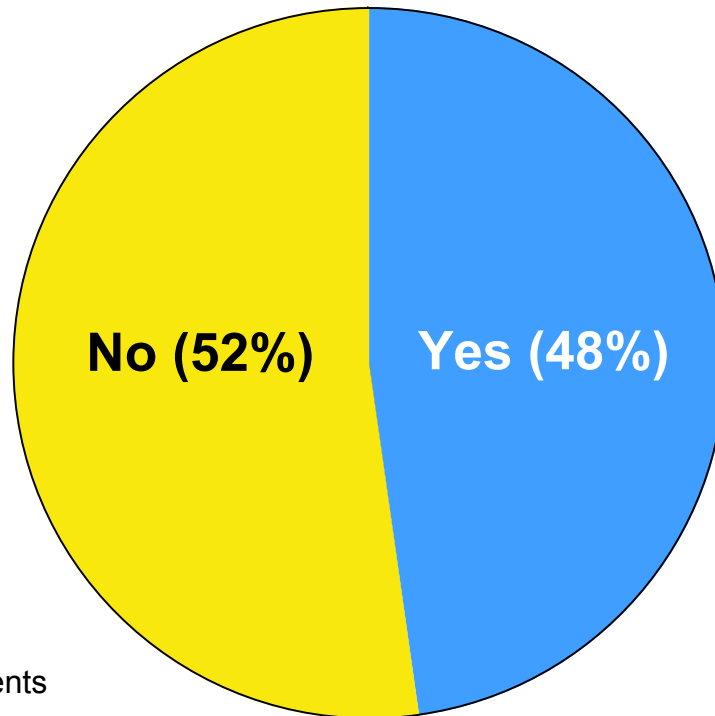


Source: Q6mrs

Base: 98 responses from 64 valid cases



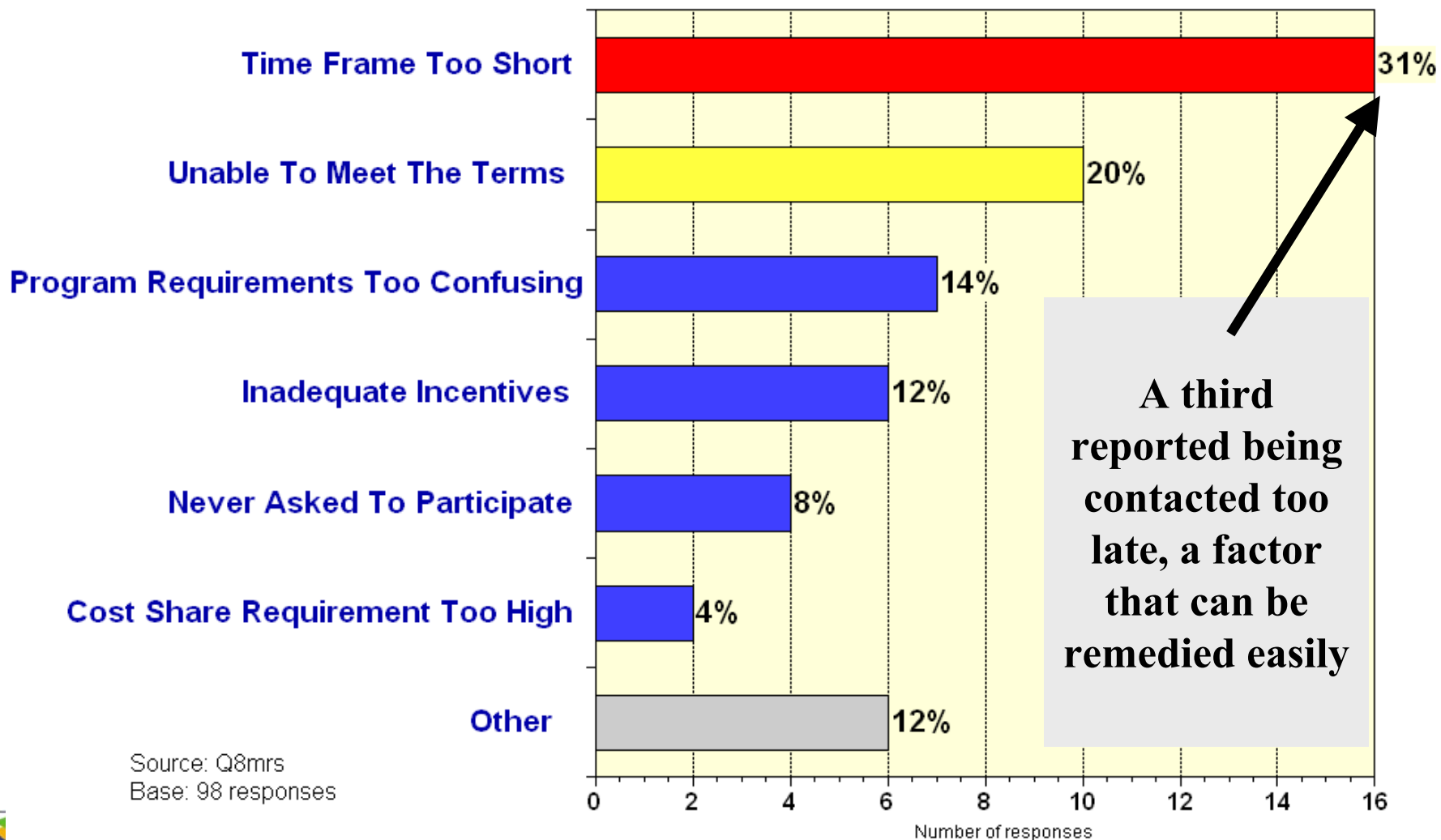
## Q7. Are you a participant in NYSERDA's PON 585 or PON 577 ?



**A 50%  
yield rate:  
70% knew  
about the  
programs,  
48% took  
advantage.**

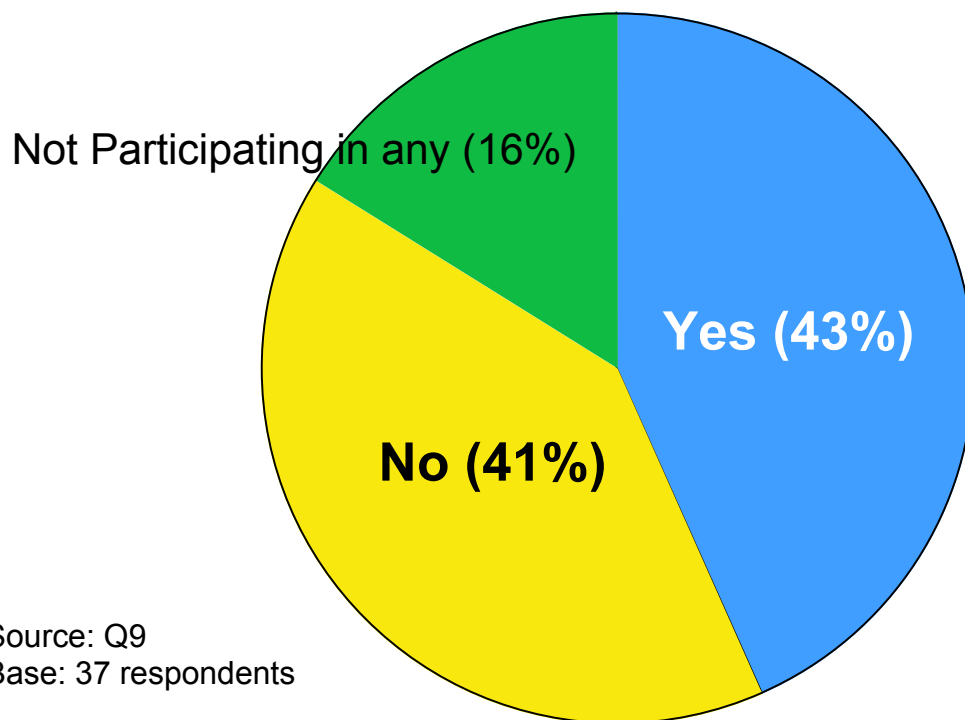
Source: Q7  
Base: 65 respondents

## Reasons for Not Participating in NYSERDA's PON 585 or PON 577



Source: Q8mrs  
Base: 98 responses

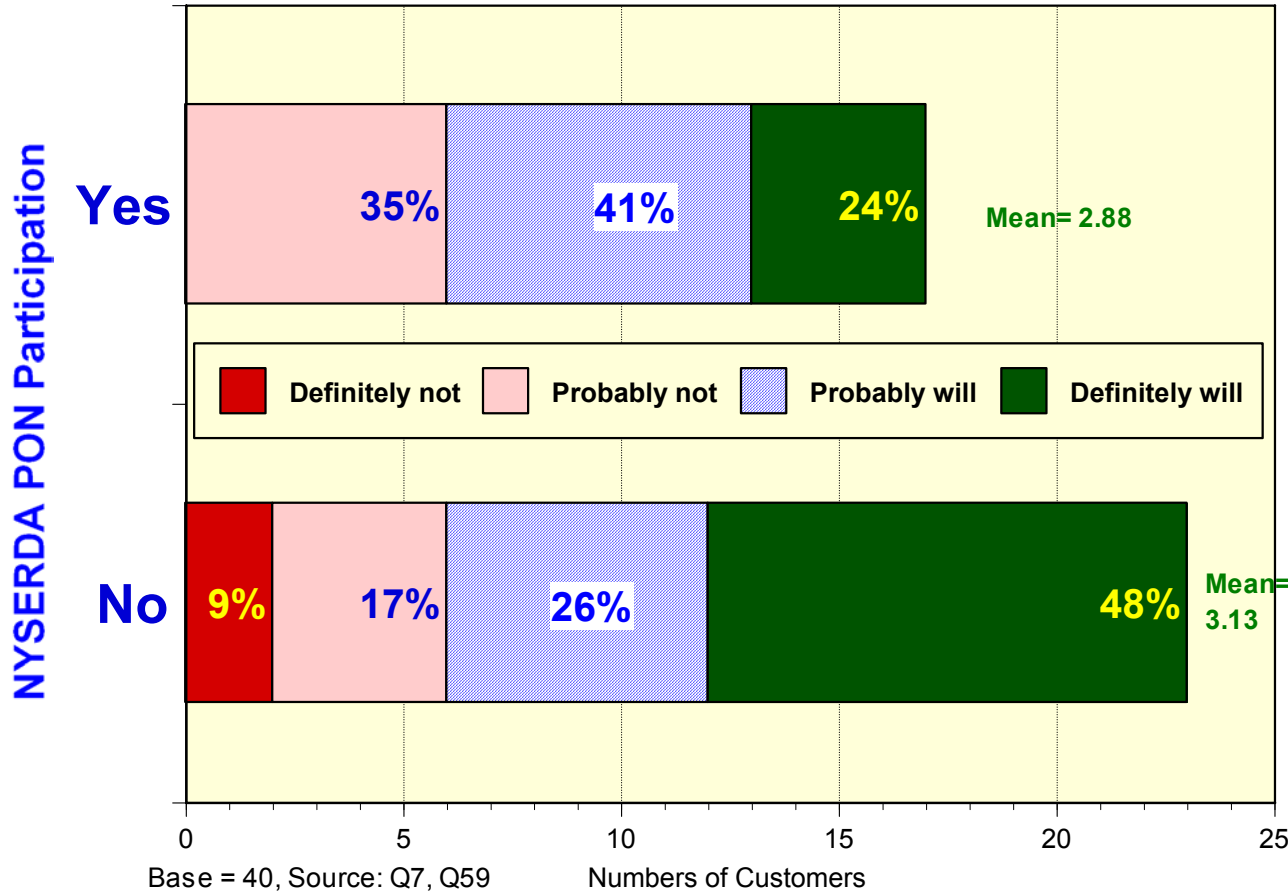
## Q9. Was your participation in NYSERDA's PON 585 or PON 577, critical to your participation in an Electricity Load Management Program in 2001?



Source: Q9  
Base: 37 respondents

**About half report that they don't need enabling assistance.**

## NYSERDA PON Participation & 2002 Intended EDRP Participation



Fewer who had participated in NYSERDA PONs said they definitely would participate in the 2002 EDRP than did those who did not participate in the PON. But, it is not a statistically significant difference.

# Process Improvement Survey

*Complete details for this section can be found in Chapter 5 of the NYISO Final Report*

# Process Improvement Survey

- Feedback mechanism for entities that provided end-use customers with service for NYISO PRL programs
- Sections:
  1. Background Information
  2. Interactions with NYISO
  3. Interactions with NYSDPS
  4. Interactions with NYSERDA
- Responses: 6 LSEs and 3 CSPs

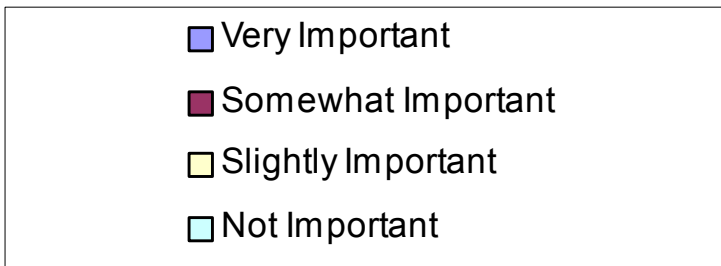
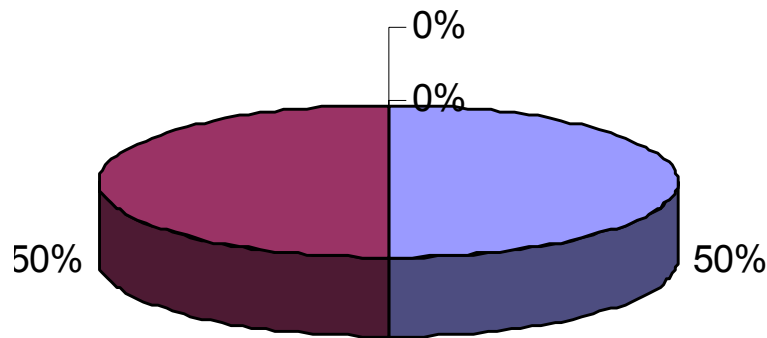
# PI Survey Findings – PON 577

Q #	Question	# Responses	
86	Did organization receive funding for either PON 577 or PON 585?	6	Yes: 3
87	Participate in 577?	4	Yes: 2
88	How did organization learn about PON 577?	2	PON Notice (1), NYSERDA web site or brochure (1)
89	Customers segments targeted for PON 577?	3	Med. Commercial (2) Lg. Commercial (1)
90	Period funding was available	2	Very Satisfied (1), Somewhat Dissatisfied (1)
91	Simplicity of program requirements	2	Satisfied (1), Somewhat Satisfied (1)
92	Eligibility for program	2	Satisfied (2)
93	Cofunding requirements	2	Somewhat Satisfied (1), Somewhat Dissatisfied (1)
94	Application Requirements	2	Satisfied (1), Dissatisfied (1)
95	NYSERDA reporting requirements	2	Somewhat Satisfied (1), Somewhat Dissatisfied (1)

# PI Survey Findings (2)– PON 577

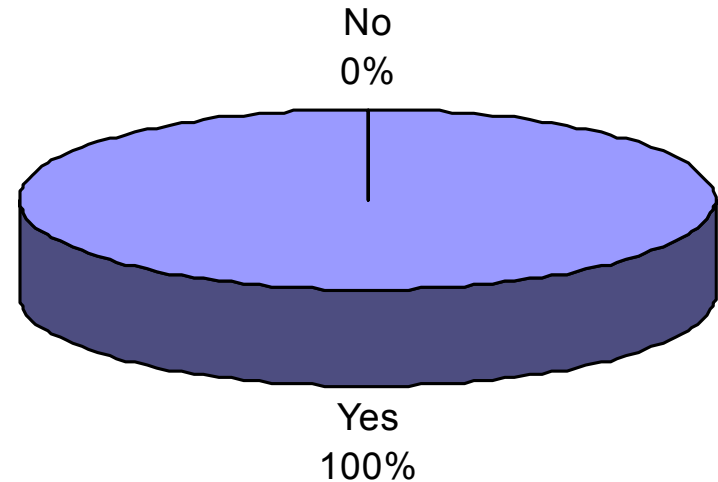
**Q 96 - Overall importance of PON 577 funding for encouraging PRL program enrollment**

**Q96 - 2 Responses**



**Q 97 – Plan to participate in similar program next year?**

**Q97 - 2 Responses**





# PI Survey Findings – PON 585

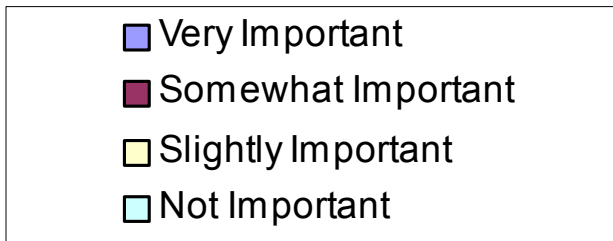
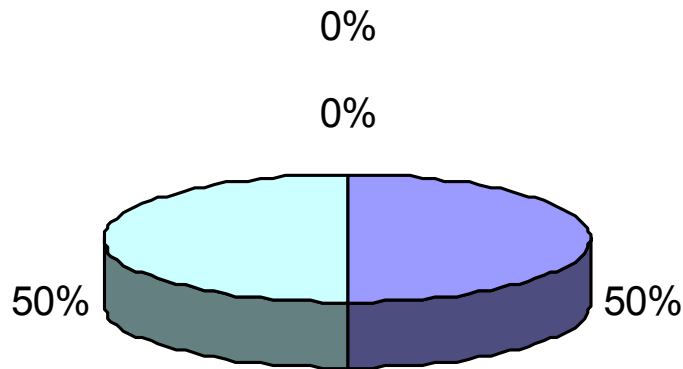
Q #	Question	# Responses	
86	Did organization receive funding for either PON 577 or PON 585?	6	Yes: 3
98	Participate in 585?	4	Yes: 1
99	How did organization learn about PON 585?	3	NYSERDA web site or brochure (1), Customer seeking funding (2)
100	Customers segments targeted for PON 585?	4	Small Commercial (1), Med. Commercial (2), Lg. Commercial (1)
101	Period funding was available	2	Somewhat Satisfied (1), Somewhat Dissatisfied (1)
102	Simplicity of program requirements	1	Dissatisfied (1)
103	Eligibility for program	2	Somewhat Satisfied (1), Dissatisfied (1)
104	Cofunding requirements	2	Satisfied (2)
105	Application Requirements	2	Satisfied (1), Somewhat Dissatisfied (1)
106	NYSERDA reporting requirements	2	Very Satisfied (1), Satisfied (1)

# PI Survey Findings (2)– PON 585

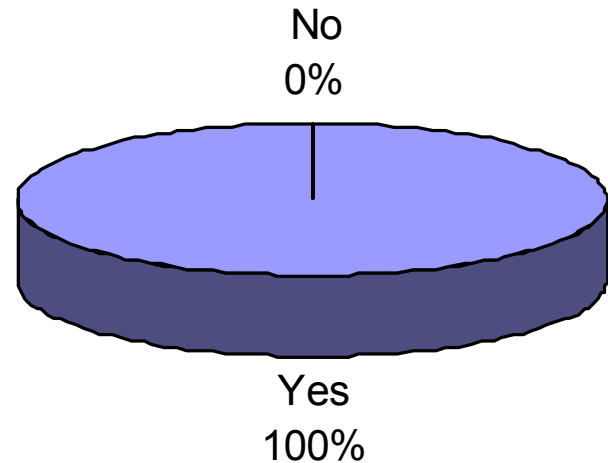
**Q 107 - Overall importance of PON 585 funding for encouraging PRL program enrollment**

**Q 108 – Plan to participate in similar program next year?**

**Q107 - 2 Responses**



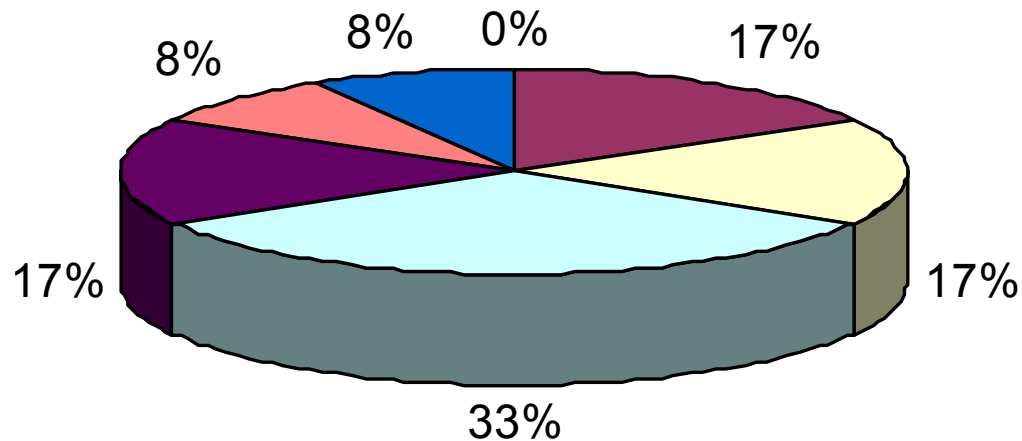
**Q108 - 2 Responses**



# PI Survey Findings

PI Surveys received: 10

## Reasons for not participating in either PON 577 or PON 585 (multiple response question - 4 responses)



- 0 ■ Did not know about them
- 2 ■ Found out about them too late to use this summer
- 2 ■ Not applicable to our situation
- 4 ■ No customer interest
- 2 ■ Too complex
- 1 ■ Insufficient value
- 1 ■ Other

# Performance of NYSERDA-funded EDRP Participants vs. Non-NYSERDA Participants

	All EDRP Subscribers			
	Overall Total Number of EDRP Subscribers	Total Pledged Hourly MW Reduction	Total Average Hourly MW Performance	Wgt. Performance Ratio
Non-NYSERDA	209	545.1	316.0	0.56
PON 577 Only	40	99.6	64.2	0.66
PON 585 Only	36	53.1	31.4	0.59
Both PON 577 & 585	7	14.2	6.8	0.48
<b>Totals</b>	<b>292</b>	<b>712.0</b>	<b>418.5</b>	

	Subset of All EDRP Subscribers with positive EDRP Performance						Total Summer 2001 MW Performance	Total Summer 2001 Program Payments
	Number of Customers	% of Total Analyzed	Total Pledged Hourly MW Reduction	% of Total Analyzed	Total Average Hourly MW Performance	Wgt. Performance Ratio		
Non-NYSERDA	154	75%	472.0	88%	316.0	0.65	6,041.4	\$3,069,601
PON 577 Only	32	74%	83.1	72%	64.2	0.77	1,427.4	\$748,566
PON 585 Only	22	61%	48.2	91%	31.4	0.65	568.9	\$287,442
Both PON 577 & 585	5	71%	13.6	96%	6.8	0.50	121.8	\$61,471
<b>Totals</b>	<b>213</b>	<b>73%</b>	<b>616.9</b>	<b>87%</b>	<b>418.5</b>		<b>8,159.4</b>	<b>\$4,167,079</b>

## Chapter 6 – Appendix B

### NYSERDA Contractor Interviews

As part of the NYISO PRL Evaluation, NYSERDA selected six contractors to provide feedback on their experience with funding programs supporting NYISO’s price responsive load programs, PON 577 and PON 585.

Each contractor was asked to complete the NYISO Process Improvement Survey<sup>1</sup> as a starting point for the interview. Project background information, including project reports to NYSERDA, were provided to Neenan Associates. In addition, each contractor was interviewed to collect additional insight.

#### **Contractor Interviews**

A Contractor Interview outline was developed as a guideline for the personal interviews conducted with the contractors<sup>2</sup>. This outline covered four topical areas:

- Contractor Profile
- Getting Involved with NYSERDA Programs
- Contractor’s Perspective on Program Value
- Solution Offered

Interviews were conducted in person or via conference call. The attached table includes summary responses to questions, organized by topical area. In addition, selected comments and suggestions that contractors wished to convey were summarized onto a separate table for report to NYSERDA without attribution (Pages 6-86 through 6-89).

#### **Summary**

NYSERDA’s contractors are generally satisfied, but offered many suggestions for improvement, especially in the areas of support and program timing. Suggestions for support improvements include designating key account managers to handle larger contractors who are active in multiple PONs and establishing regional offices to make NYSERDA more accessible to contractors and customers around the state. Program notification and project duration are listed as key areas for improvement to permit contractors to mobilize a project team, order and install equipment.

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<sup>1</sup> NYISO sent a process survey to each LSE and CSP who subscribed customers to the 2001 PRL programs. Results of those survey responses are discussed in the NYISO Final Report, Chapter 5.

<sup>2</sup> Five of the six contractors were interviewed; the sixth contractor’s project report was used as a substitute for a personal interview.

## **Appendix C:**

### **Impact of Enabling Technologies on Customer Load Curtailment Performance**

#### **Summer 2001 Results from NYSERDA's PON 585 and 577 Program and NYISO's Emergency Demand Response Program**

**Charles Goldman, Lawrence Berkeley National Laboratory**  
**Grayson Heffner, Lawrence Berkeley National Laboratory**  
**Michael Kintner-Meyer, Pacific Northwest National Laboratory**

#### ***Executive Summary***

This report describes a market and load research study on a small group of participants in the NYISO Emergency Demand Response Program (EDRP) and the NYSERDA Peak Load Reduction and Enabling Technology Program Opportunity Notices. The study was conducted by the Lawrence Berkeley National Lab (LBNL) and the Pacific Northwest National Lab (PNNL) at the request of NYSERDA with full cooperation of the NYISO and the NYISO Price Responsive Load Working Group.

With funding support from the Department of Energy, LBNL and PNNL are conducting research on price-responsive load technologies and programs. This case study examined a group of 14 individual customers who participated in subsidiary price responsive load programs offered by NYSEG, AES NewEnergy, and eBidenergy/ConsumerPowerLine. These contractors were selected because they used supplemental funding from NYSERDA to develop and provide enabling technologies that we hypothesize should improve customers' ability to perform well during curtailments. In particular, both NYSEG and eBidenergy/ConsumerPowerLine offered their customers access to their hourly load data on a day-after basis and, during curtailment events, on a near-real-time basis. Phone interviews were conducted with most customers, while 25% of customers provided initial responses to the survey protocol via email. We then combined the market research information with load data during the curtailment events of August 7-10, 2001.

### **Performance Indicators**

We developed two indicators, the subscribed performance index (SPI) and the peak performance index (PPI), that reflect how well customers performed during curtailment events. The SPI is a ratio of the customer's actual hourly load curtailed averaged over all hours of curtailment divided by the customer's subscribed load, which is the target they set for themselves at the outset of the program. The PPI has the same numerator but the denominator is the customer's non-coincident facility peak demand and provides an indicator of performance relative to the technical potential of load curtailment for that customer.

Table ES-1 shows the average value and standard deviation for the sample of 14 respondents when sorted into subgroups according to whether they participated in the SCR/ICAP program and whether they possessed and were able to use back-up generation (BUG). Based on our two performance indicators (SPI and PPI), we found that those customers with back-up generators and those who participated in the ICAP program had much better performance compared to customers that participated only in the voluntary EDRP program or did not have back-up generators. The reasons for these differences are straightforward:

- Customers with back-up generators have much more discretion over how and how much they reduce their total load in response to curtailment events. As a result of possessing this strategic asset, these seven customers were able to meet, and often out-perform, their subscribed goals (i.e., SPI of 1.04) and their actual curtailed load represented about 46% of their non-coincident facility peak demand (see Table ES-1).
- Customers participating in the ICAP program face a substantial performance penalty if they do not attain their demand reduction amount when called by the NYISO. For them this is not a "voluntary" program with no penalties. Thus, these eight customers, on average, performed near their subscribed load targets (i.e., SPI of 0.92).

**Table ES-1. Customer Performance in EDRP Program: Impact of Backup Generation (BUG) and ICAP Program Participation.**

Customer Group	N	Curtailed Load/Subscribed Load (SPI)	Curtailed Load/Customer Peak Demand (PPI)
Customers w/ BUG	7	1.04 +/- 0.55	0.46 +/- 0.37
Customers w/o BUG	7	0.32 +/- 0.30	0.05 +/- 0.04
Customers in EDRP and ICAP	8	0.92 +/- 0.61	0.41 +/- 0.37
Customers in EDRP only	6	0.35 +/- 0.31	0.05 +/- 0.05

The seven customers that relied on load reductions only to curtail typically employed a variety of conservation and operational strategies (e.g., turning off lights, resetting thermostats, reducing pump and compressor loads). Their pledged curtailment as a fraction of facility peak demand was low, averaging 5% over our sample. There was no evidence of Customer Performance “fatigue” found over the limited number of curtailment events in Summer 2001. Customers in all subgroups performed as well or better on the second and third day of curtailment as on the first.

### **Implications for NYISO System Planners**

Our case study of 14 customer may have one important implication for NYISO system planners. Our results suggest that customer participation in an ICAP-type program is likely to significantly increase the probability that customers also enrolled in an emergency-type program (e.g., EDRP) will actually curtail their subscribed load during curtailment events. Our finding that eight customers that participated in both EDRP and ICAP programs had superior performance compared to the six customers that enrolled in EDRP only should be tested over the entire sample of 292 EDRP participants. Such analysis could improve the future ability of NYISO to predict customer’s actual load reductions during curtailment events compared to their subscribed load. The Neenan Associates evaluation of the 2001 EDRP program notes that the PRL program provided reliable and predictable resources to the NYISO from an hour-by-hour perspective over a several day period (e.g., within 5% of the average of 420 MW) and also found that maximum hourly curtailment in the EDRP program was about 60% of total subscribed



load (i.e., 425 vs 712 MW).<sup>1</sup> Our results suggest that there were potentially two sub-groups of participants in the EDRP program (those in EDRP only and those enrolled in EDRP and ICAP) with very different performance characteristics. Future changes in ICAP program design could have major spill-over effects on EDRP performance.

### **Impact of Enabling Technologies**

A major objective of our work was to assess the impact of enabling technologies on customer's demand response capability and performance. In our small sample, we found that: (1) web-based near-real time load monitoring was very useful for achieving load reduction targets & educating management, (2) that some customers have quickly adopted the technology for other energy management uses (e.g., turning off various processes to see impact on overall load), (3) that the installed base of back-up generation provides an important load curtailment resource, and (4) that almost all customers relied on manual approaches to respond to curtailment events, rather than automated response.

### **Primary Customer Motivations for EDRP Program Participation**

Customers indicated that the primary motivators for working with the contractors and participating in the EDRP program were saving money on their utility bill, access to economic incentives offered by the program, and the fact that program participation was voluntary and that they retained control regarding decisions on whether and how much load to curtail.

### **Suggestions for NYSERDA**

Given the fact that the NYISO programs are relatively new and that it takes users some period of time to realize the full benefits of adopting innovative demand-response technologies, we would recommend that NYSERDA consider additional evaluation/case studies in order to (1) document other benefits (besides load curtailment capability) that customers receive from enabling technologies supported in the Peak Load Reduction Program, and (2) develop a more robust understanding of relationships between adoption

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<sup>1</sup> Neenan Associates, *NYISO PRL Program Evaluation: Executive Summary*, pg. 6 and 29.

of enabling technologies, performance of customers individually in curtailing load, and the influence of other confounding factors (e.g., participation in other programs, such as ICAP/SCR).

## **1. Introduction**

The restructuring of U.S. electricity markets has created new opportunities for load serving entities, such as utilities or retail energy suppliers, or curtailment service providers (e.g., aggregators) to partner with customers in curtailing or altering their demand in response to either electric system reliability needs or high prices in electricity markets. Although the benefits of allowing customers to manage their loads in response to system conditions or wholesale market prices are potentially large, there are numerous challenges to creating workable price-responsive load programs in wholesale markets. Success in facilitating customer participation in day-ahead or real-time markets for power hinges on both enabling technologies and market/institutional requirements. From a policy perspective, technologies that facilitate price-responsive load are important because they introduce higher elasticity in the customer's demand curve, which can

Enabling technologies for price-responsive load include, but are not limited to:

- widespread deployment of interval meters with two-way communications capability;
- multiple, user-friendly communication pathways to notify customers of load curtailment events;
- energy information tools that enable near-real-time access to interval load data;
- demand reduction strategies that are optimized to meet differing high-price or electric system emergency scenarios;
- building energy management control systems that facilitate automation of load curtailment strategies at the end use level; and
- onsite generation equipment, used either for emergency, back-up or to meet primary power needs of a facility.

With funding from the Department of Energy Office of Power Technologies, Lawrence Berkeley National Laboratory (LBNL) and the Pacific Northwest National Laboratory (PNNL) are conducting research on price-responsive load programs and technologies.<sup>2</sup> As part of that effort, the LBNL/PNNL team worked with stakeholders in two states (New York and California) and conducted market research on the impact and role of various technologies that enable customers to participate more effectively in price-responsive load programs.

In 2001, NYSERDA made awards to five contractors under PON 585 (“Enabling Technology for Price Sensitive Load Management”). In this program, NYSERDA provided up to \$150,000 for contractors to demonstrate technologies that would expand the capability of NYISO market participants (either Load Serving Entities or Curtailment Service Providers) to reduce load in response to emergency and/or market-based price signals. Eligible technology solutions for customers included real-time communications and metering capability, two-way communication protocol, web-enabled technology, real-time price forecasting capability, and technologies that automate load curtailment. NYSERDA also made awards totaling \$6 million under its Peak Load Reduction program (PON-577). The Peak Load Reduction program had four components: Permanent Demand Reduction efforts (e.g., EMCS upgrades, controls), Short-Duration Load Curtailment measures (e.g., radio-frequency controlled strategies, telemetry controls), Dispatchable Emergency Generator initiatives (e.g., installation of transfer switchgear, catalytic reduction technologies, dual-fuel options), and Interval Meters. NYSERDA funding for installation of enabling technologies or infrastructure helped customers to participate in the NYISO price-responsive load (PRL) programs: Emergency Demand Response Program (EDRP) and Day-Ahead Demand Response program (DADRP). Based on discussions with NYSERDA and willingness of contractors to cooperate, three

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<sup>2</sup> The “Load As A Resource” projects’ overall objective are to: assess and support development and demonstration of key DR enabling technologies; evaluate technical, market and institutional barriers that influence direct participation by customer loads in electricity markets; and identify and support dissemination of “best practices” among program administrators, contractors/aggregators, and end users.

contractors agreed to participate in this study: New York State Electric and Gas (NYSEG), AES New Energy (AES), and eBidenergy/Consumer Powerline.

We worked closely and attempted to coordinate this study with the comprehensive evaluation of the NYISO programs that was conducted by Neenan Associates. Specifically, customer survey protocols were shared in order to minimize duplication of topics, attempts were made to minimize overlap in surveying customers, and our market research results were provided to Neenan Associates. Conceptually, the LBNL/PNNL study used a case study approach with a small sample of customers to focus on such topics as customer load curtailment strategies, customer's perception of the effectiveness of various technologies that facilitate load curtailment, and relationships between contractors, customers, and NYISO programs.

The report is organized as follows. Section 2 describes our overall research approach and objectives and the customer market survey instrument. Section 3 summarizes the program and technology offerings of the three contractors and includes a description of customers that responded to the survey. Section 4 describes the performance indicators developed to assess customer performance and discusses the results of our analysis of customer load curtailment data and customer surveys. Section 5 summarizes conclusions from our case study of 14 participating customers.

## **2. Approach**

Our research on price-responsive load programs and technologies is intended to provide insights on three general questions:

- What end uses do customers target for load reduction (e.g., HVAC, lighting, elevators, process loads)?
- How effective are enabling technologies on influencing absolute levels and persistence of load reductions that can be achieved in buildings?
- What price and non-price attributes of contractor/program service offerings seem to contribute to customer/end user compliance, performance, and retention?

The specific objectives of this research project are to:

- elicit opinions from a sample of customers that participated in the NYISO price-responsive load programs and received demand response technologies, communication equipment, or information software from contractors that participated in the NYSERDA program on:
  - the value of specific enabling technologies,
  - motivations for participating in the contractor's program and the NYISO PRL programs
  - the contractor's program design and implementation
  
- increase our understanding of:
  - how customers assess their load management capabilities and what curtailment strategies they adopt
  - customer investments and preparations for curtailments
  - the role of automation in executing load curtailments
  - the role of back-up generators in load curtailment goal-setting and performance
  - how facility operators and/or occupants are affected by curtailments
  - how enabling technologies affect customer satisfaction and willingness to continue participating

Given time and budget constraints, LBNL/PNL informed NYSERDA/NYISO that we could conduct phone interviews with ~20-25 customers. In selecting among the contractors, our goals were to work with both a LSE and a CSP in order to get diversity in service providers and work with contractors that were providing innovative demand response technologies or service offerings. Contractor's willingness to cooperate was ultimately critical as they provided customer contact information to LBNL/PNNL and informed and urged customers to cooperate by being interviewed. Two contractors pre-screened customers enrolled in their program and provided LBNL/PNNL with a sub-set of customer that were willing to be interviewed. This further reduced our potential sample. One contractor provided us with contact information for all of their customers.

LBNL/PNNL developed an interview protocol that was used by PNNL facility engineers to conduct phone interviews. Participating customers were assured that responses would be treated as confidential and that results would be presented in aggregate so that customer-specific information would not be reported. Some customers requested the interview questions in writing prior to the phone interview. About 75% of the responding customers were ultimately interviewed by phone, while the remaining 25% of customers sent back answers to the interview questions via email, and were then contacted by PNNL facility engineers to clarify answers to questions. Interviews were conducted during late November and early December 2001. It is worth noting many New York area facility operators were preoccupied and burdened with additional responsibilities in the aftermath of the destruction of the World Trade Center in September 2001.

The phone survey included questions on the following topics:

- Facility description: type, ownership characteristics, vintage, operational schedule, and typical monthly summer electricity usage and peak demand
- Basis for developing load curtailment goals (e.g., subscribed load in NYISO PRL program)
- Load curtailment strategies: specific technologies or operational strategies, targeted end uses; set of questions on back-up, emergency generators (e.g., fuel source, type of generator, size, vintage, parallel or stand-alone operation, estimated “running costs” of generator)
- Customer views on extent to which they met load curtailment goals and suggested changes to improve results
- Additional costs or investments made by customers to participate in PRL programs
- Curtailment notification scheme (e.g., phone, fax, email, pager) and implementation procedures (e.g., manual schemes, semi-automated, fully-automated, other)
- Estimated load reduction during August 2001 curtailments
- Notification and/or involvement of facility occupants during load curtailments
- Questions on specific enabling technologies offered by each LSE/CSP

- Relative importance of reasons why customer participated in the contractor's program (i.e., motivation)
- Customer views on whether they intend to continue participating in load curtailment programs
- Suggestions for improvement

Electricity usage data for periods prior to and including the curtailment events (August 7-10) were provided by contractors or NYISO. In our analysis, for each customer, we combined customer hourly load and load curtailment data with market survey information in order to examine factors that might explain their load curtailment performance. Results from this study should be interpreted with caution, given the small sample size and the case study approach.

### **3. Customer Research Framework**

All regulated load serving entities in New York and numerous curtailment service providers offered programs under the broad umbrella of the New York ISO's Price-Responsive Load programs. Several program developers applied for and won supplemental funding from NYSERDA's Program Opportunity Notices 585 (Enabling Technology) and 577 (Peak Load Reduction). After discussions with both NYSERDA and individual LSEs and CSPs, we chose three programs which offered particularly interesting technology features, such as advanced notification devices and meter data hosting technologies. The NYSERDA supplemental funding allowed the LSEs and CSPs to recruit customers, install, test and verify interval meter reading at the customer sites, and provide web-enabled data hosting capabilities allowing customers to track their load on a day-after or near real-time basis. The following section describes the particular service and technology offerings by the selected three LSEs/CSPs. More detail on all of the NYSERDA funding participants can be found in Chapter 6 of the Neenan Associates evaluation.

### **3.1 New York State Electric & Gas Corporation (NYSEG)**

NYSEG is a regulated investor-owned load serving entity that marketed a subsidiary program called the C.A.\$.H. BACK program. The program targeted commercial and industrial customers interested in gaining access to the NYISO programs. The C.A.\$.H. BACK program provided participating customers with the following services and equipment:

- Consultation by NYSEG staff to identify load curtailment opportunities and to discuss curtailment strategies.
- Installation of electronic pulse interval meter and connection to a phone line for automated meter reading.
- Subscription to Energy Profiler Online (EPO) website, including training literature.<sup>3</sup>The EPO website provided the following features:
  - Tracking of load data on a day-after basis during non-curtailment days. During curtailment periods, the meter was interrogated every 15 minutes to provide rapid feedback to the customer on effectiveness of the curtailment, allowing customers to adjust or refine their curtailment strategy to improve curtailment performance.
  - Customer baseline information, where the calculated baseline load shape can be viewed as a graph superimposed into load data graphs. This feature provides an instant overview of their curtailment performance.
  - For participants of the Day-Ahead Demand Response Program, the EPO website provided a nomination screen for entering the demand bids for NYISO's day-ahead market.
  - Billing information to quantify payments for each curtailment.
  - Selection of notification means such as email or pager.
- Alpha-numeric pager for emergency event notification.

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<sup>3</sup> Energy Profiler Online is a commercial product offered by ABB Energy Interactive.



The NYSEG program was well-subscribed, and NYSEG program managers signed up over 35 customers with the anticipation of a cumulative load reduction of 93 MW for the EDRP and 49 MW for the DADRP.

### **3.2 AES NewEnergy**

AES NewEnergy is a curtailment service provider operating in retail and wholesale markets around the country. AES NewEnergy marketed the NYISO PRL programs as the Voluntary ISO Profit Program, or VIP, to their existing energy customer as well as an independent service offering to non-energy customers.

AES NewEnergy notified participating customers via pager and email and followed up the receipt of the electronic notification with a confirming telephone call. AES NewEnergy did not provide alpha-numeric pagers. Plans are underway to introduce a curtailment module within AES NewEnergy's WebJoules website for the summer of 2002. The web-site will provide access to load data including the graphing of the customer baseline and billing data for performed curtailments. This web-based service was not available for the summer of 2001.

### **3.3 eBidenergy.com, Inc. and ConsumerPowerline**

The teaming of eBidenergy.com and ConsumerPowerline brought together technology and energy services, with eBidenergy.com as the technology provider and ConsumerPowerline as the energy service provider. eBidenergy.com offered web-enabled software for data hosting and a metering platform, while ConsumerPowerline was responsible for the recruitment of commercial and industrial customers for the NYISO PRL programs.

Each program participant was provided access to eBidEnergy.com's PowerTrak website, which included the following features and functions:

- Scheduling and nominating demand bids for NYISO's DADRP.
- Access to customer's 15-minute load data providing graphing features of individual

and aggregated loads. On curtailment days, load data are updated every 15 minutes to enable customers to adjust and refine curtailment strategies to improve performance. On non-curtailment days, load data were updated once per day.

- Determining customer baseline with graphing features to superimpose over load data to indicate curtailment performance.
- Analysis of demand reduction to determine customers’ performance with respect to their load reduction targets.
- Curtailment billing features to estimate curtailment credits.
- Notification selection providing the customer to select preferred means of notification and contact addresses.

In addition, customers received electric meters where metering technology was insufficient for interfacing with the PowerTrak web technology.

**3.4 Target Sample and Respondent Results**

The LSE and two CSPs contacted their EDRP and DADRP customers to determine their willingness to participate in the LBNL/PNNL customer market survey. We received a self-selected sample of customers willing to be interviewed. Table 1 summarizes the LBNL/PNNL respondent selection and survey results, including initial respondent pool, number of respondents, and response rate. The survey achieved an overall response rate of 61%.

**Table 1: Summary of Market Research Target Sample and Survey Results**

	<b>Number of Participants</b>	<b>Number of Participants Responded</b>	<b>Response Rate</b>
AES NewEnergy	12	6	50%
Ebidenergy.com/ ConsumerPowerline	4	2	50%
NYSEG	7	6	86%
<b>Total</b>	<b>23</b>	<b>14</b>	<b>61%</b>

**Table 2: Facility Characteristics of Survey Respondents**

No	Program enrolled	Peak demand [kW]	Curtailement target [kW]	Subscribed generation capacity [kW] <sup>4</sup>
1	EDRP	21,000	2,000	0
2	EDRP	8,500	500	0
3	EDRP	2,300	500	0
4	EDRP	400	100	0
5	EDRP	1,400	200	0
6	EDRP	1,350	200	0
<b>EDRP Only sub-total</b>		<b>34,950</b>	<b>3,500</b>	
7	EDRP/ICAP	1,500	900	>1000
8	EDRP/ICAP	1,900	750	0
9	EDRP/ICAP	27,000	2,000	2,000
10	EDRP/ICAP	1,200	1,200	1,200
11	EDRP/ICAP	5,000	4,500	4,500
12	EDRP/ICAP	500	500	500
13	EDRP/ICAP	1,200	500	600-900
14	EDRP/ICAP	4,400	200	200
<b>EDRP/ICAP sub-total</b>		<b>42,600</b>	<b>10,550</b>	
<b>Total</b>		<b>77,550</b>	<b>14,050</b>	

Table 2 shows that the total subscribed load reduction for our respondents was 14.05 MW, with the majority (10.55 MW) enrolled in both the EDRP and the ICAP programs. All EDRP/ICAP participants had sufficient generation capacity to meet the subscribed ICAP requirements, except for one office building, which entirely relied on load reduction to meet the ICAP load reduction target.

#### **4. Results: Analysis of Customer Surveys and Load Curtailments**

##### **4.1 Load Curtailment Data Analysis**

Performance in curtailing loads may be evaluated on an aggregate or program total basis and on an individual customer basis. Our study focused on the individual

<sup>4</sup> Note: The column labeled “Subscribed generation capacity [kW]” represents generator capacity committed to the program(s). There are facilities (e.g., health facilities), which have back-up generators, but, may not commit them to the program. In that case, the on-site generation capacity is indicated as zero.

customer level and performance results were sorted by program type or customer characteristics (size, back-up generation) to identify trends in performance as a function of customer attributes.

Load curtailment performance at the individual customer level is conventionally measured by a comparison of hourly actual customer loads against an assumed or calculated baseline load for a given hour. The baseline load may include adjustments for actual conditions such as weather or customer work/production schedules. Such a detailed performance analysis at the customer and hourly level is necessary for settlement purposes but difficult to generalize for comparison purposes. Therefore, we have established two related performance indicators that broadly represent customer performance and allow for easy comparison of performance across customers or customer groupings.

Our two performance parameters calculated for each event are the *subscribed performance index (SPI)*, and the *peak performance index (PPI)*. The SPI is the ratio of the customer's hourly load curtailed averaged over all hours of curtailment divided by the customer's subscribed load. It describes how well a customer performed on average relative to the performance goal or target they set for themselves at the outset (i.e., their subscribed load in the NYISO EDRP program). Therefore, an SPI of unity (i.e., 1.0) indicates the customer is performing "on target". SPI values of less than one indicate under-performance while values greater than one reflect a customer who is "over performing" relative to his load reduction target. The PPI has the same  $P_{avg}$  numerator as the SPI but the denominator is the customers' maximum demand or peak non-coincident demand. The PPI thus reflects a different kind of performance measure – performance relative to the technical potential of load curtailment for that customer. Thus, a PPI of 1.0 would be achievable only by a customer who can shed 100% of their peak demand over the entire curtailment period.

Formally, the Subscribed performance index (*SPI*) is defined as:

$$SPI = P_{avg} / P_{sub}$$

where: 
$$P_{avg} = \frac{1}{N} \sum_{t=1}^{t=N} (CBL_t - P_{actual,t})$$

with:  $N$  : number of hours per curtailment event,  
 $P_{actual,t}$  : facility demand in hour  $t$ , [kW],  
 $CBL_t$  : customer base line , [kW]<sup>5</sup>

and

$P_{sub}$  : subscribed load curtailment as provided for each participating customer by NYISO.

The Peak Performance Index (*PPI*) is defined as:

$$PPI = P_{avg} / P_{peak}$$

where

$P_{peak}$  : non-coincident facility peak demand.

$P_{peak}$  was determined using the customer load data, which we received from the LSEs/CSPs. For those cases where only generation data were provided to the NYISO or incomplete facility load data was provided by the LSE/CSP, we used self-reported facility peak demand as obtained from our customer survey.

These two performance indicators are useful in differentiating among customers that adopted different participation strategies. Participants that enrolled in the program and took a conservative approach are more likely to meet their subscribed load reduction targets than those who are more aggressive. However, both an aggressive and a conservative participant can contribute the same kW of load curtailment to the reliability of the power system but achieve different *SPIs* if their curtailment commitment differs.

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<sup>5</sup> The computation of the CBL is defined in the NYISO: Emergency Demand Response Program Manual. NYISO, revised 5/24/2001.

We recognize that the choice of these performance indicators is a departure from the implicit price elasticity concept traditionally used to denote a scale or measure of demand responsiveness. We deliberately chose not to use an elasticity framework because of an assumed lack of price diversity among the customer sample. Assuming a prevailing TOU rate schedule for most commercial and industrial customers through New York State with a summer peak energy charge of about 9-10 ¢/kWh (or \$90-100/MWh), the remaining price differential between the avoided energy cost (assumed \$100/MWh) and the EDRP energy payment in the amount of \$500/MWh would not provide an appreciable price differentiation to attribute different levels of customer curtailment capabilities. In addition, energy costs for customers served by competitive retail energy suppliers was not readily available or likely to be provided.

#### **4.2 Key Findings**

- Customer performance is primarily driven by EDRP customer participation in the ICAP program and by whether they own and use back-up generators

A major objective of our work was to assess the impact of enabling technologies on customers' demand response capability and performance. In the New York ISO PRL programs, we found that an individual customer's incentive to perform was most impacted by two factors: (1) their participation in other existing load management programs offered by the NY ISO (i.e., ICAP/SCR); and (2) their ability to utilize back-up generation in response to load curtailments. A particularly dominating feature in terms of customer performance and responsiveness seemed to be dual participation in the EDRP programs and the ICAP/SCR program, which allowed customers to receive capacity payments in addition to their EDRP payments if they qualified their load capability. ICAP/SCR participants face substantial penalties for non-compliance, therefore they tend to outperform those that only participated in the EDRP.

Table 3 shows the average values and standard deviation of SPI and PPI for the 14 customers segmented by whether they participated in the ICAP program and whether they possessed and were able to use back-up generation in responding to load

curtailments. In our 14 customer sample, customers with BUGs accounted for 2/3 or more of the total load reduction, which is much higher than the total sample of 292 EDRP participants in which customers with BUG accounted for ~15% of the total subscribed load.

**Table 3: Customer Performance in EDRP Program: Impact of Backup Generation (BUG) and ICAP Program Participation.**

Customer Group	N	Curtailed Load/Subscribed Load (SPI)	Curtailed Load/Customer Peak Demand (PPI)
Customers w/ BUG	7	1.04 +/- 0.55	0.46 +/- 0.37
Customers w/o BUG	7	0.32 +/- 0.30	0.05 +/- 0.04
Customers in EDRP and ICAP	8	0.92 +/- 0.61	0.41 +/- 0.37
Customers in EDRP only	6	0.35 +/- 0.31	0.05 +/- 0.05

Using the two simple performance measures adopted for this analysis – SPI and PPI – we found that the customers with back-up generators and who participated in the ICAP program had superior performance. These two sets of customers in fact routinely over-performed, delivering more than their subscribed curtailment when called upon.

We note here and throughout that the set of respondents with back-up generators and the set of customers participating in both the EDRP and the ICAP program were identical, except for one customer who participated in the ICAP program that did not possess a BUG.

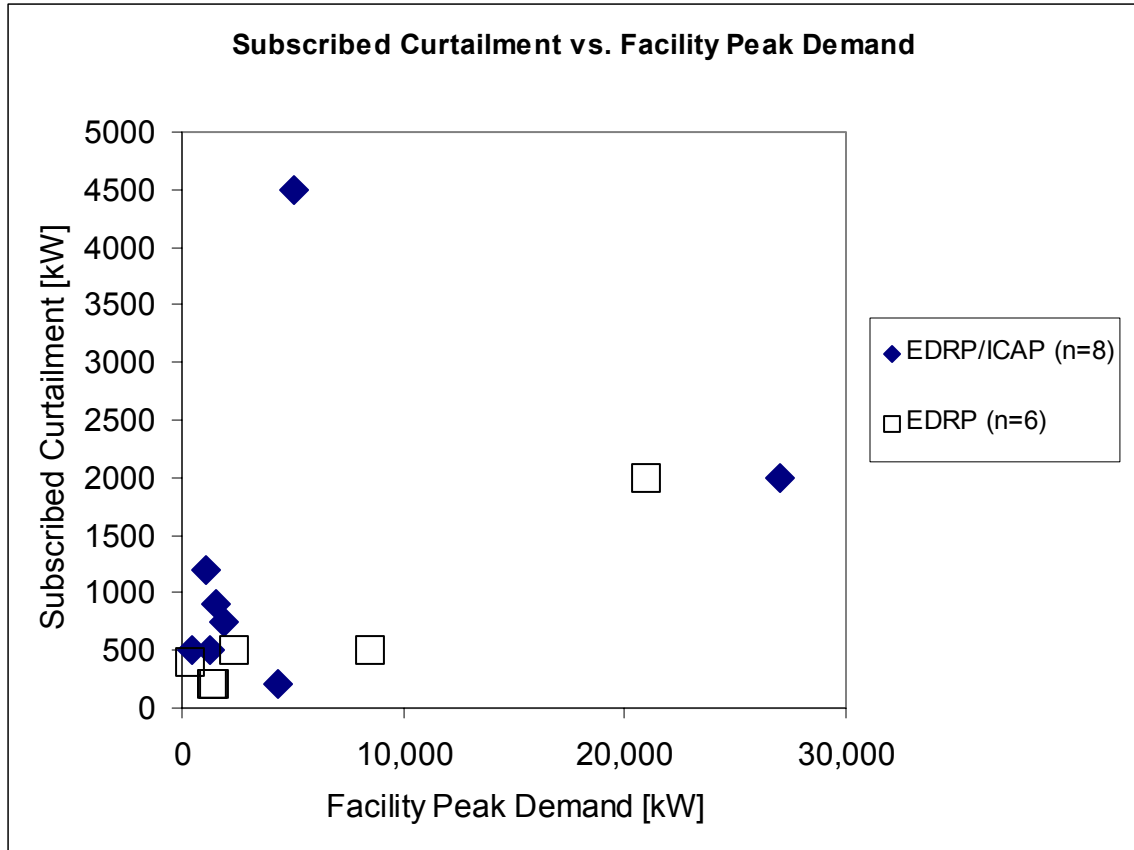
- Customer size mattered less in terms of curtailment pledge and performance than participation in ICAP programs or possession of a back-up generator

This finding emerged from our customer market research with 14 respondents and the load data analysis confirmed this result. Specifically, we found that:

- Most customers without back-up generators set relatively conservative demand reduction. Their pledged curtailment as a fraction of peak demand was very low – perhaps 5 %;
- Larger customers did not necessarily set higher demand reduction goals - unless they possessed back-up generators. For example, a customer with 7,000 kW of peak

demand but no BUG set a load curtailment goal of 100 kW, whereas a 400 kW customer with a BUG set a load curtailment goal of 200 kW;

- Smaller customers can set ambitious demand reduction goals (as a % of total maximum demand) if they have back-up generation.



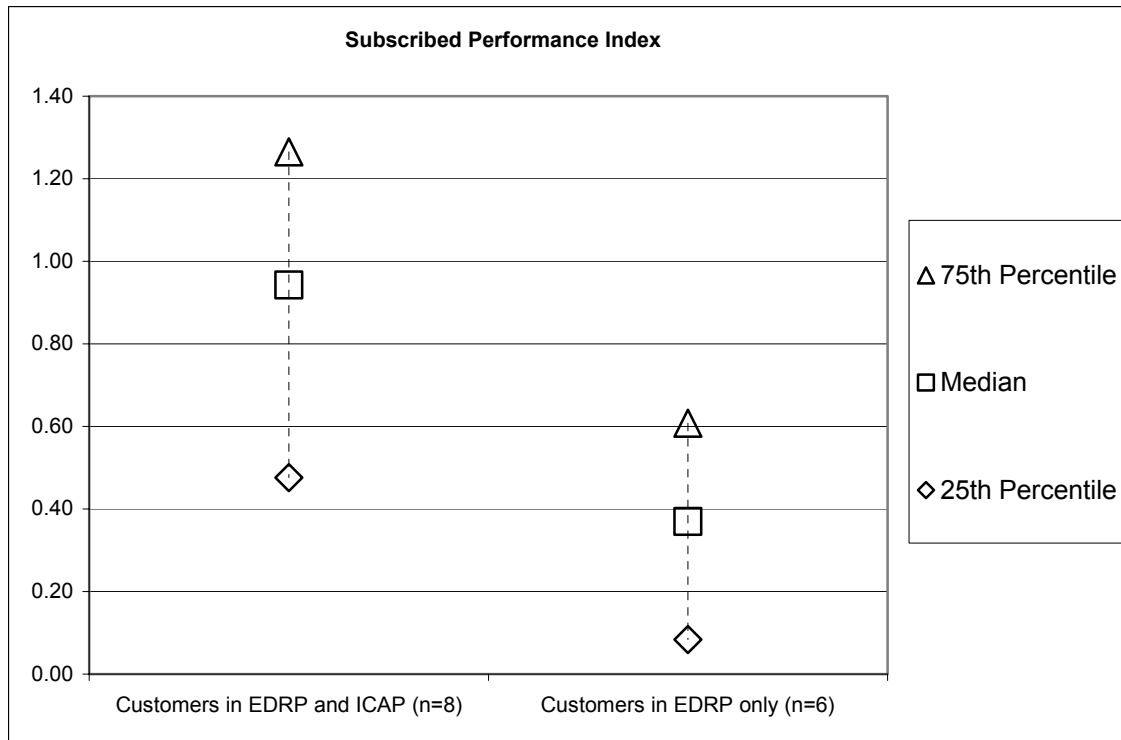
**Figure 1: Subscribed Load Curtailment vs. Facility Peak Demand**

These qualitative results were supported by load analysis which shows the distribution by size of the 14 respondents (see Figure 1). Most respondents were relatively medium to large commercial/industrial customers with facility peak demand less than five MW, with three exceptions. The EDRP/ICAP participants generally subscribed considerably larger amount of curtailable load than EDRP-only customers of similar size, with only one exception.



- Customers that enrolled in both EDRP and ICAP as well as customers with back-up generation generally met and in some cases exceeded their curtailment commitments

The salutary effect that reservation payment and performance penalties have on customer performance can be seen in Figure 2 below. Here we have taken the results from our 14 respondents on 3-4 (depending on the customer) curtailment days and sorted them by whether they participated in the ICAP program. We have plotted the range of performance results across these customers and curtailment and indicated the median and  $\pm 25^{\text{th}}$  percentile points for each group.

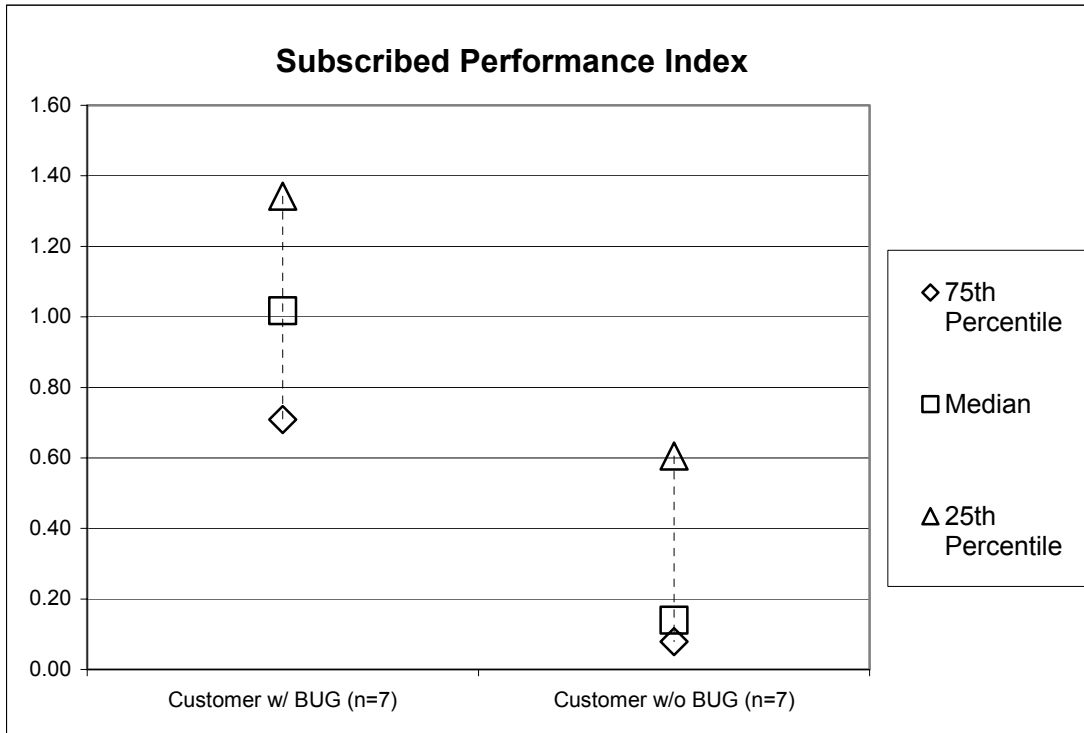


**Figure 2: Variation in Customer Performance in EDRP only and EDRP/ICAP programs: Actual Curtailed Load/Subscribed Load (SPI)**

The superior performance of customers facing penalties is apparent in Figure 2. The median performance over 8 respondents and 4 curtailment days was right around 1.0 – their performance goal. There were some under-performers who face penalties but there

were equally many over-performers who curtailed with room to spare. On the other hand, median performance index values in the purely voluntary EDRP program was only 35% of the curtailment goal.

Figure 3 shows a similar depiction of the range of performance results for respondents with back-up generators compared to those without back-up generators. A similar pattern is found: customers with no back-up generation fell short of their curtailment goals and in some cases performed very poorly. The customers with back-up generators were more typically on target in terms of making their performance goals and in several cases significantly outperformed their targets.



**Figure 3: Variation in Customer Performance with and without Back-up Generation: Actual Curtailed Load/Subscribed Load (SPI)**

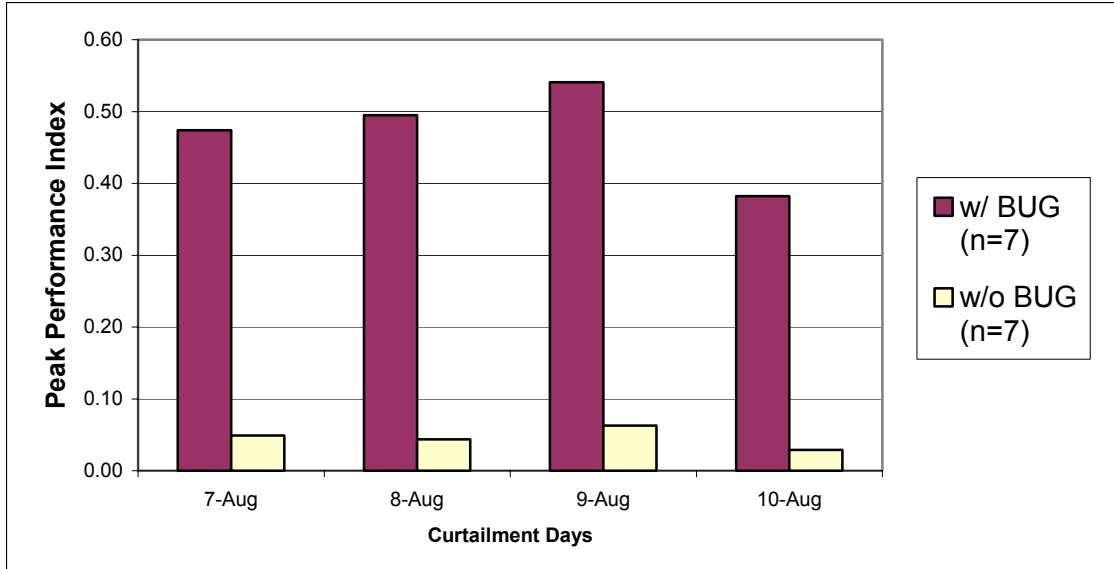
- No evidence of Customer Performance “fatigue” was found over the limited number of curtailment events in Summer 2001

Some load curtailment programs (e.g., Interruptible Rate Programs in California) have encountered problems with “customer fatigue” when frequent or successive curtailment events have been called. In some of these programs, “customer fatigue” has deteriorated the level of aggregate load curtailment available as a function of frequency or cumulative number of events.

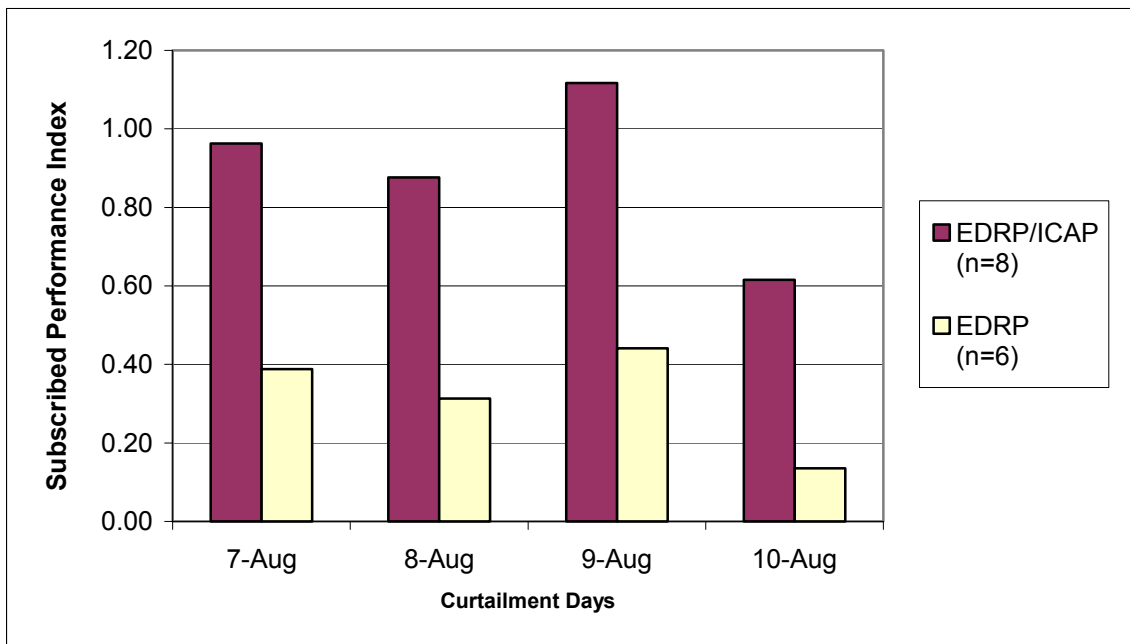
We found no evidence of customer fatigue over the period August 7-10 within the ranks of the four key sub-groups in our analysis. Even though the average performance level was different in each group, that level did not appear to deteriorate during the four consecutive event days.

Figures 4 and 5 depict the average performance levels of these four groups during the week of August 7-10, 2001. In Figure 4, we use the PPI performance parameter and compare the two groups of respondents with and without back-up generators. In addition to the large difference in overall performance levels, we see that performance actually improved over the first three days with a small drop-off on the fourth day. Although the level of performance was much higher for the group possessing back-up generators, the consistency of performance across curtailment days was similar.

Figure 5 uses the SPI performance indicator and compares the group of respondents participating in both EDRP and ICAP versus those participating only in EDRP. Given the similarity in the composition of these two groups, we see a similar pattern. Customers that only participated in the EDRP program generally performed at 30-40% of their curtailment goal, whereas customers on EDRP and ICAP deliver loads much closer to – and sometimes above – their curtailment goal. Within each group, however, the curtailment performance was reasonably consistent across the curtailment events except for a drop-off on August 10. Results for August 10<sup>th</sup> can not be directly compared to the previous three days, because customers in Western New York were not included in the curtailment call on that particular day.



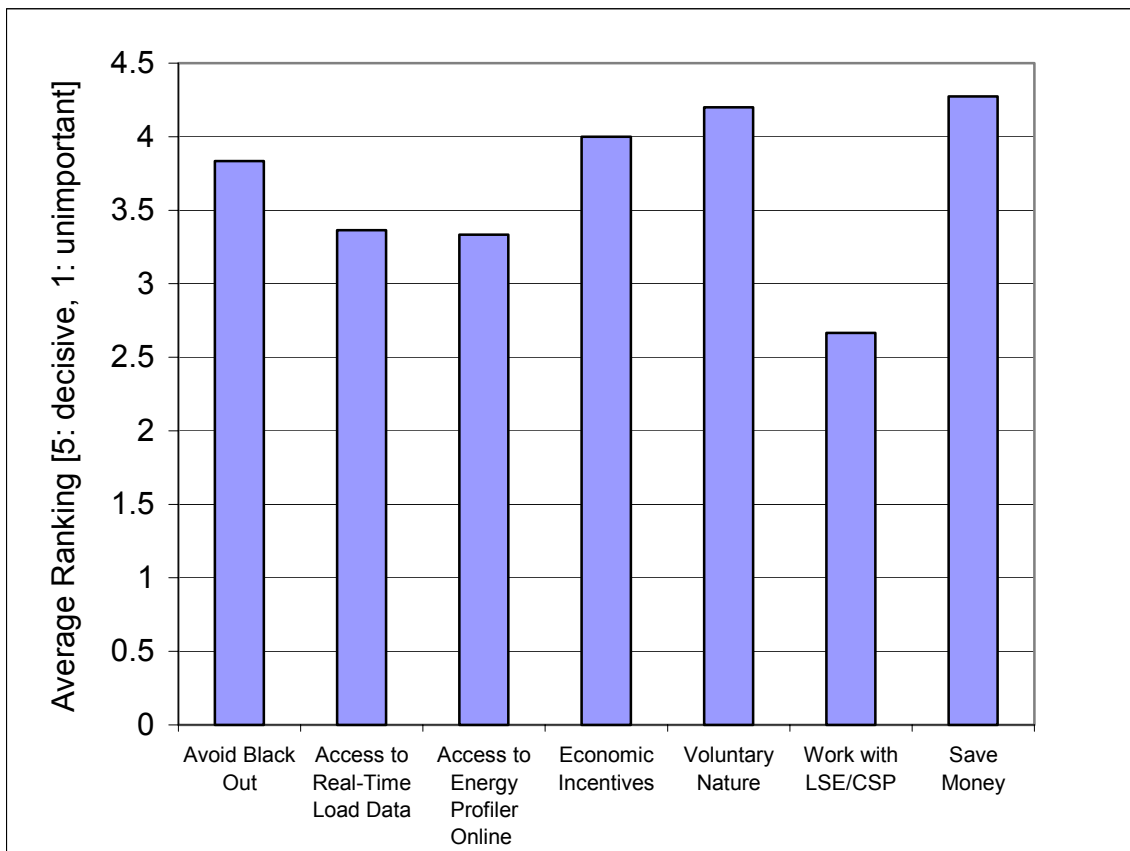
**Figure 4: Load Curtailment Potential and Persistence**



**Figure 5: Customer Performance and Persistence of Load Curtailments**

- We found no difference in performance based on customer motivations for joining the program

In our efforts to understand what customers valued about curtailment program design and features, we asked several survey questions regarding what motivated customers to participate in the EDRP program. The average “scores” of these potential motivators on a 1 to 5 increasing scale of importance to their decision is shown in Figure 6 below. We found, not surprisingly, that the overwhelming motivator to participate was “to save money” (4.3). The voluntary nature of the program was the second-most-important motivator, at least for those in the EDRP programs only.



**Figure 6: Customer Motivation for Signing up for EDRP Program (n = 12)**

We conducted exploratory analysis to assess whether motivation correlated at all with performance levels and found no significant differences in the average scores on motivation between the four subgroups. Results from our small sample suggest that

none of the “motivating factors to participate” deemed decisive by individual respondents seemed to be particularly correlated with either good or bad performance.

- Customer use of enabling technologies was not particularly correlated with good or bad performance or with any of the subgroups

In addition to examining motivations for enrolling in the PRL program, we also asked respondents questions about the technology features offered by their contractor and whether they used them. In particular, customers were asked how frequently they monitored their load data (for those respondents who had this feature), what type of notification they preferred, and what type of automation of load control they employed.

We combined the survey data with the load data and examined correlations between “early adoption” of technology features and customer performance. Once again, we found no significant association between our definition of early technology adoption and individual customer performance. We also found no differences in technology adoption levels across the four key subgroups.

Results from our small sample suggest that other technology features (e.g., access to near-real time data, extent of automated load control strategy) were less important in impacting customer performance compared to the importance of participation in ICAP or possession of back-up generation.

### **4.3 Customer Surveys: Specific Findings**

This section discusses specific findings based on comparative analysis of customer survey responses. The findings are discussed in the form of questions and answers, patterned after the design of the survey.

4.3.1 What kind of investment did customers incur to join the programs? Did investment lead to better performance??

- The majority of survey respondents reported overtime of staff for implementing load reduction methods and procedures.
- Most respondents reported that it didn’t take much time to familiarize themselves with the use of web-enabled tracking tools.

- Back-up generators represented a significant in-place investment as they were a central load curtailment strategy for 7 of 14 respondents. Respondents with back-up generators did not report additional capital investment or costs for switchgear.
- One customer that currently used semi-automated energy management strategies with their building automation system reported incurring additional costs for program curtailment procedures. This customer performed fairly poorly with a SPI of 0.07, suggesting that at least in the first year, automated demand response strategies did not allow the customer to predict accurately their load curtailment (compared to their subscribed load).
- Based on our small sample, it was difficult to discern much of a relationship between incremental customer investments in DR enabling technologies (over and above the funding provided by NYSERDA) and overall performance in the ERDP pilot program.

#### 4.3.2 How did customers like certain specific design features of the program, such as:

- Web-based near-real time (e.g., day-after) access to load data

Web-based near-real time load monitoring was very useful for achieving load reduction targets & educating management. The majority of respondents valued ABB's Energy Profiler Online (EPO) as a useful tool to learn load management strategies. Several facility managers reported that they experimented with various load curtailment strategies by analyzing their impact as shown on EPO graphs. Several customers reported that the EPO graphing features provided useful visual tools for discussion of load curtailment results with upper management.

Customers have quickly adopted the technology for other uses, such as studying systems response by turning off processes and estimating the bottom-line impact on the load.

- Alarming and notification using alpha-numeric pagers.

Pagers were valued as a useful and reliable notification means. However, several respondents indicated that redundant means of notification was valuable to ensure timely notification (e.g., a confirming phone call by the LSE or CSP).

- Day-of-curtailment near real-time access to their load data

Several respondents monitored the near real-time load data and adjusted their curtailment strategies based on whether they were meeting their contractual subscribed load.

- Extent of automated load curtailment response

Majority of customers curtailed load using manual approaches. Only two customers pre-programmed load reduction methods into the EMCS to be invoked when curtailment calls were received.

#### 4.3.3 What were the major demand reduction strategies as stated by customers? What end-uses were most commonly targeted?

- Based on customer responses, we grouped load curtailment measures into three broad strategies: (1) backup generation only, (2) load reduction, and (3) load reduction and backup generation.

Five customers used only backup generators, while two others used both backup generators and load reduction measures. For those customers with BUGs, they represented most if not all of the curtailment strategy. Seven customers used load reduction strategies exclusively. Most commonly reported load reduction measures were: (1) reduced lighting load by turning off banks of lights, and (2) reduce cooling load by resetting thermostats (e.g., one participant used absorption cooling switching from electricity to steam). Other load reduction strategies



focused on facility specific large individual loads, such as air compressors and large pumps.

4.3.4 Customer satisfaction with the program? Participation plans for next year? Were the occupants an impediment to load curtailment or a part of the solution?

Customers reported high enthusiasm for participating in next year's PRL programs. Customers with backup generators impacted their facility occupants minimally.

For customers that relied on load reductions only, occupants did not complain about thermal comfort and loss of productivity as long as their was appropriate notification. Several facilities requested active participation by occupants to improve curtailment performance (e.g., occupants turn off lights and shut off non-essential equipment). Several customers reported that they incentivized occupants to participate in curtailments.

## **5. Conclusions and Recommendations**

We offer the following conclusions and recommendations based on our case study of 14 customers that worked with three contractors participating in the NYISO EDRP.

- We developed two indicators, the subscribed performance index (SPI) and the peak performance index (PPI), in order to facilitate comparison of performance among customers or between customer groupings. The SPI is a ratio of the customer's actual curtailed load averaged over all hours of curtailment events divided by the customer's subscribed load. The PPI has the same numerator but the denominator is the customer's non-coincident facility peak demand and provides an indicator of performance relative to the customer's technical potential for load curtailment.

- For those customers with back-up generators, use of BUGs represented their primary curtailment strategy. The seven customers with back-up generators seemed confident in setting demand reduction goals at or around the size of their generators and their actual curtailed load represented about 46% of their non-coincident facility peak demand (see Table 3). Moreover, customers with BUGs often over-performed during curtailments, consistently cutting their load by more than their initial contracted goals (as indicated by an average SPI of 1.04; see Table 3).
- The seven customers that relied on load reductions only to curtail typically employed a variety of conservation and operational strategies (e.g., turning off lights, resetting thermostats, reducing pump and compressor loads). Their pledged curtailment as a fraction of facility peak demand was low, averaging 5% over our sample.
- Performance of individual customers in the EDRP program also appears to be driven by their participation in the existing load management program (ICAP/SCR). The combination of another incentive stream, in the form of capacity reservation payments, coupled with substantial penalties for non-compliance led the eight customers that participated in both the EDRP and ICAP programs to meet their subscribed load goals during the four curtailment events (e.g., SPI of 0.92).
- From the perspective of a NYISO system planner that is concerned about the predictability and reliability of emergency demand response programs, our results suggest that customer participation in an ICAP-type program is likely to increase the probability that customers enrolled in an emergency-type program will actually curtail their subscribed load during curtailment events. Our finding that eight customers that participated in both EDRP and ICAP programs had superior performance compared to the six customers that enrolled in EDRP only should be tested over the entire sample of 292 EDRP participants. Such analysis could improve the ability of NYISO to forecast accurately customer's actual load reductions during curtailment events compared to their subscribed load.

- A major objective of our work was to assess the impact of enabling technologies on customer's demand response capability and performance. In our small sample, we found that: (1) web-based near-real time load monitoring was very useful for achieving load reduction targets & educating management, (2) some customers have quickly adopted the technology for other energy management uses (e.g., turning off various processes to see impact on overall load), (3) the installed base of back-up generation provides an important load curtailment resource, and (4) almost all customers relied on manual approaches to respond to curtailment events, rather than automated response.
- Customers indicated that the primary motivators for working with the contractors and participating in the EDRP program were saving money on their utility bill, access to economic incentives offered by the program, and the fact that program participation was voluntary and that they retained control regarding decisions on whether and how much load to curtail.
- Given the fact that the NYISO programs are relatively new and that it takes users some period of time to realize the full benefits of adopting innovative demand-response technologies, we would recommend that NYSERDA consider additional evaluation/case studies in order to (1) document other benefits (besides load curtailment capability) that customers receive from enabling technologies supported in the Peak Load Reduction Program, and (2) develop a more robust understanding of relationships between adoption of enabling technologies, performance of customers individually in curtailing load, and the influence of other confounding factors (e.g., participation in other programs, such as ICAP/SCR).

## **6. Acknowledgements**

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### Case Study Interview Results for Selected NYSERDA Contractors

	Contractor 1	Contractor 2	Contractor 3	Contractor 4	Contractor 5	Contractor 6
<b>Contractor Profile</b>						
Contractor's business model and activities	Energy and power quality monitoring and software	ESCO	Load Serving Entity	Electronic products manufacturer	Internet data service provider specializing in energy information	ESCO
Motivation for supporting load management activities			part of corporate strategy	Reduce energy costs	Part of corporate strategy	Leverage PRL payments by ISO
Business goals for this initiative	Help customer develop integrated energy management plan	Help customers use emergency generators to participate in EDRP	Get customers to reduce load to reduce company and customer exposure to high prices	Reduce demand charges	To build customer service base through new market programs	Demonstrate integrated bidding systems
Short- and long-run expectations for participating in this market	Will continue to support the needs of this large customer and keep abreast of new opportunities in this market	Will continue to help customers use generation to cut electricity costs through these programs	Will continue (in part because of PSC regulations), but also strong corporate commitment	Look for funding opportunities at every plant shut-down	Will continue to expand	Programs pose too many barriers to make it worthwhile
<b>Getting involved with NYSERDA programs</b>						
How they found out about PON 577	On contractor's mailing list, previous work with NYSERDA	Previous work with NYSERDA	Through the PRL WG and NYSERDA PON mailing	From a contractor, customer applied directly to NYSERDA	On contractor's mailing list, previous work with NYSERDA	PON Notice
Involvement prior to PON 577	Pilot study PON.		Involved in several NYSERDA DSM projects	None	Grant funding for software development	
Value from participation	Ability to help customer achieve its energy program objectives	Covering expenses for adding load to generators and meter funding	Helped encourage customers to participate in EDRP	Funding support can make or break a project	Credibility as information service provider	Build experience
<b>Processes to decide to participate</b>						
Who initiated	For both PON 577 and EDRP, we brought the information to the customer	Worked both ways, some customers/aggregators came to us and we recruited some customers	Hel breakfast meetings to introduce the NYISO PRL programs to our customers	Customer was looking for avenues for funding of an energy management project	We provide service to customers primarily recruited by LSEs and CSPs. Occasionally end-use customers will come to us.	

### Case Study Interview Results for Selected NYSERDA Contractors

	Contractor 1	Contractor 2	Contractor 3	Contractor 4	Contractor 5	Contractor 6
<b>Contractor Profile</b>						
<b>Establishing participation feasibility</b>	We worked at a very high level in the company and it was well received	primarily using generation	Concentrated on C&I customers who self-selected as a result of informational breakfasts	(This customer did not participate in EDRP)	The LSEs and CSPs recruited customers	Tariffs precluded participation in DADRP
<b>Key barriers and hurdles of customers</b>	Very large organization with many sub-organizations	getting funding for improvements to participate in a program that might never run		PON availability to coincide with project timing	From our perspective, organizing the installation	
<b>Plans for response strategy</b>	Run generators	Run generators		Variable frequency drives	LSEs and CSPs did this	Daily bidding into DADRP
<b>What enabling technologies were used</b>	Permanent metering on generators, and extensive notification procedures	We put in load recorders that were web-enabled via phone line	ABB's Energy Profiler Online	VFDs linked to EMS	Our internet information service with either a remote phone line recorder or a web-enabled recorder with LAN connection.	Customer's on-site energy management system and custom evaluation tools
<b>Hurdles in recruiting customers</b>	Mostly internal to the customer	Some NYISO program attributes were too complex, NYSERDA funding was not adequate for some meter installations, so customers did not participate	Getting letters of intent from customers for the PON		The LSEs and CSPs recruited customers	Skeptical of benefits
<b>How did NYSERDA funding contribute to customer's decision to participate</b>	This customer could not have participated without NYSERDA's funding because they did not want to invest in improvements that had the potential risk of a long payback	getting funding for improvements to participate in a program that might never run	We showed customers what the NYSERDA offering was worth to them. The NYSERDA money was very important in getting these customers on board at no cost to them.	(This customer did not participate in EDRP)	The LSEs and CSPs recruited customers	
<b>What were customer's expectations for benefits</b>	Expected to have more available, but weren't able to get permits in time for some locations.					\$1 - 2.00/KW curtailed that it gets elsewhere (LIPA/Cinergy)

### Case Study Interview Results for Selected NYISERDA Contractors

	Contractor 1	Contractor 2	Contractor 3	Contractor 4	Contractor 5	Contractor 6
<b>Contractor Profile</b>						
<b>Notification of events</b>	E-mail, pagers and manual telephone confirmation	E-mail (primary through tertiary contacts) with telephone confirmation	E-mail and telephone	(This customer did not participate in EDRP)		NYISO phone calls for EDRP
<b>Contractor's perspective on program value</b>						
<b>Customers' expectations about ability to respond</b>	Procedures were key to the large scale implementation plan and they worked.			Customer felt they needed more advance notice to respond (5-6 hours)		Planned to curtail 50KW per site over 7 sites
<b>Did customers respond as planned</b>	Yes, expect where permitting was delayed		Some did and still didn't get paid because of the CBL calc	(This customer did not participate in EDRP)		No, precluded from both EDRP and DADRP due to tariff provisions
<b>Problems encountered in responding</b>	Advisories required mobilization of several union employees, but cancellation of advisories was slow in coming and cost the customer overtime expenses		Some customers were affected by the CBL calculation	(This customer did not participate in EDRP)		CBL biased against weather-sensitive customers
<b>Innovative solutions deployed?</b>	Our solution included a web service and procedures so that a customer knew what to do when a call came in and how to get information about the event	We worked with customers individually to provide information and we sent out letters after an event telling them how much money they made and numbers to call for more detail.	Internet information service tied to meter to provide near-real time feedback on usage		Internet information service tied to meter to provide near-real time feedback on usage	
<b>What were the benefits realized</b>	Customer is now aware of its ability to respond and how much value that response is worth	Ability to get funding for adding load to generators	Customer is now aware of its ability to respond and how much value that response is worth	Customer was able to find more energy cost savings than anticipated.	Customer is now aware of its ability to respond and how much value that response is worth	Customer has lost interest in NYISO programs
<b>Were benefits more or less than expected</b>	Overall, customer is satisfied with its participation			More		Less; substantially so

### Case Study Interview Results for Selected NYSERDA Contractors

	Contractor 1	Contractor 2	Contractor 3	Contractor 4	Contractor 5	Contractor 6
<b>Contractor Profile</b>						
<b>Plans for continued involvement as a sponsor</b>	Yes, we intend to continue to participate and expect to expand our involvement	Expect to double participation in EDRP for next summer; not much interest in DADRP	Yes, we intend to continue to participate and expect to expand our involvement	Customer intends to apply for additional NYSERDA funding when appropriate	Yes, we intend to continue to participate and expect to expand our involvement	No plans to participate again
<b>Overall satisfaction with NYSERDA</b>	Customer and contractor are satisfied with NYSERDA		Somewhat satisfied - need improvement in responses to telephone calls	Satisfied	Very satisfied	
<b>Solution offered</b>						
<b>What was solution</b>	Signature system which incorporates web-enabled metering information to be displayed and reported.	Primarily manual, with some reporting about energy use during an event (after the fact)	Third-party internet information service tied to meter to provide near-real time feedback on usage	VFDs linked to EMS	Internally developed internet information service tied to meter to provide near-real time feedback on usage	In place commercial system with applications added
<b>Describe components</b>	Internet-based service with data collection from web-enabled meter	load recorder with remote telephone access	MV-90 collects data remotely from device. Data is downloaded by 3rd party to its server. Customer accesses information via internet.		Internet-based service with data collection from web-enabled meter	
<b>Main criteria in selecting the solution</b>	Developed internally, customized to customer's needs	foundation for new system being developed and tested	Vendor had a proven product with good references	Engineering study	Developed internally, primarily marketed to providers	already installed at customer site
<b>Customer training</b>	Yes		Yes		Yes	
<b>Customers' response to solution</b>	Very pleased		Very pleased		Pleased	



**Case Study Interview Results for Selected NYSERDA Contractors**

	<b>Contractor 1</b>	<b>Contractor 2</b>	<b>Contractor 3</b>	<b>Contractor 4</b>	<b>Contractor 5</b>	<b>Contractor 6</b>
<a href="#">Contractor Profile</a>						
<a href="#">Did solution meet expectations?</a>	Yes, the customer is specifically interested in seeing what their building loads are and sees the potential in the future for taking advantage of that information to participate either in other markets or other ways to reduce their cost of electricity.		Yes, we also have the ability to look at our customer's data individually or as an aggregate.			Never really tested