

Evaluation of NYISO 2001 Demand Response Programs

Presented to NYISO Business Issues
Committee
January 23, 2002

Agenda #9

Background

- Intended to quantify the impact of NYISO's Emergency Demand Response (EDRP) and Day-Ahead Demand Response (DADRP) Programs
- Evaluate Curtailment Service Provider (CSP) and end-use customer preferences as a means of improving the programs.
- Dovetailed with NYSERDA evaluation of supportive programs.
- Conducted by Neenan & Associates

Objectives

- Quantify program usage
- Evaluate market impact of programs
- Survey end-use customers (including informed non-participants) to determine program satisfaction
- Elicit alternative program designs
- Provide feedback from participating CSPs

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EDRP Participation

EDRP Participants by Subscriber and Zone					
Zone	LSE	CSP	Other	Total	
				No.	%
West	33	1	4	38	13%
Genesee	16	0	0	16	5%
Central	29	0	2	31	11%
North	5	0	0	5	2%
Mohawk Valley	23	0	0	23	8%
Capital	23	1	4	28	10%
Hudson Valley	13	2	0	15	5%
Millwood	4	6	0	10	3%
Dunwoodie	15	5	0	20	7%
NYC & LI	49	57	0	106	36%
Totals	210	72	10	292	100%
% of Total	72%	25%	3%		

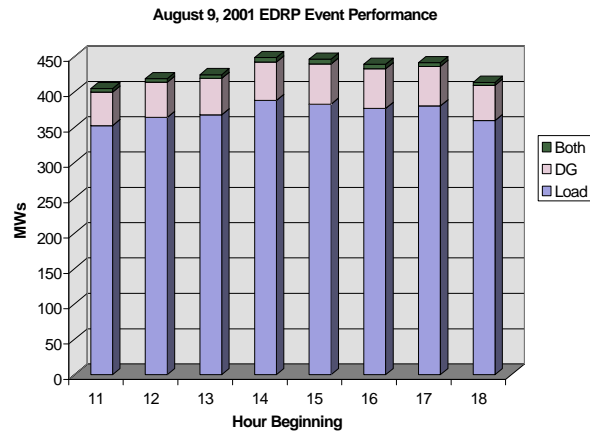
- 72% of customers subscribed by LSEs
- 55% of MW subscribed by LSEs

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EDRP Hourly Performance

- Program called for 23 hours in 2001
- Persistence of load reduction is notable
- Roughly 85% interruptible load



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Impact on Loads

Impact of EDRP on Real-Time Zonal Loads			
Zone	Average Hourly Event Value		Total EDRP Load (MWH)
	EDRP load (MWH)	% Change in RT Load due to EDRP	
Capital	63	3.1%	1,446
New York	37	0.4%	860
Long Island	6	0.1%	148
Western New York	293	3.3%	5,276
Hudson Region	19	0.5%	430
Grand Total			8,159

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EDRP Payments

- Total payments:
\$4,167,079
- Total payment if paid only at LBMP:
\$1,724,905

NYISO Payments for EDRP Load		
Zone	Total EDRP Payments	% of Total
Capital	\$746,896	18%
New York	\$420,895	10%
Long Island	\$101,653	2%
Western NY	\$2,674,234	64%
Hudson Region	\$223,401	5%
Grand Total	\$4,167,079	

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Impact on Real-Time Market

Impact of EDRP on Real-Time Zonal Prices			
Zone	Average Hourly Event Value		Total Collateral Benefits
	% Reduction in RT LBMP due to EDRP	Collateral Benefits	
Capital	28.8%	\$132,009	\$3,036,211
New York	4.1%	\$106,044	\$2,439,005
Long Island	0.6%	\$9,274	\$213,294
Western NY	21.5%	\$353,306	\$6,359,512
Hudson Region	3.8%	\$39,416	\$906,559
Grand Total			\$12,954,581

- Based on 100% load in real-time market

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Impact on Forward Contracts

EDRP Effects on Real-Time Market LBMPs		
Zone	Difference in Mean RT LBMP	Estimated Long-Term Reduction in Cost of Hedging Load
Capital	\$4.05	\$851,778
NYC	\$0.66	\$831,658
Long Island	\$0.12	\$61,709
Western NY	\$1.91	\$1,880,389
Hudson Region	\$0.60	\$242,989
Grand Total		\$3,868,525

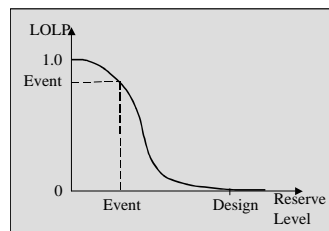
- Measures only average LBMP reduction in August
- Doesn't capture reduced volatility

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Value of Unserved Energy

- Equate program cost with value of unserved energy
- $? LOLP = ? VEUE / [(Outage Cost/MW) * (Unserved Load)]$



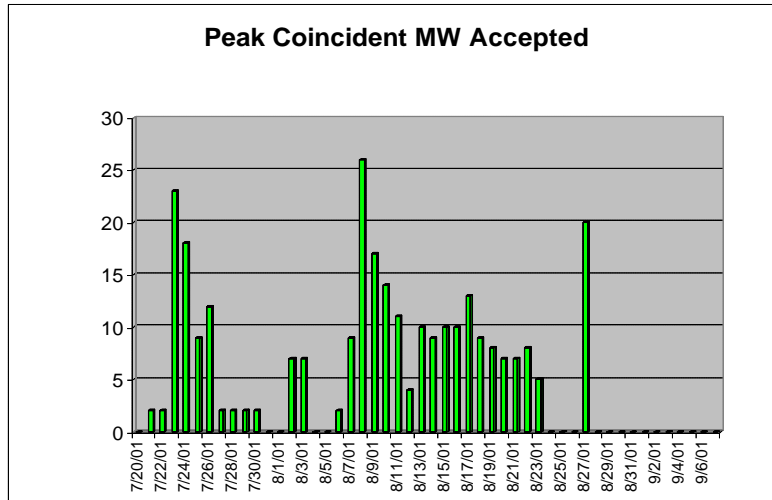
Reduction in LOLP	Hourly Value of Expected Un-served Energy, 5% of Load at Risk			
	Outage Cost			
	\$1,000/MWH	\$1,500/MWH	\$2,500/MWH	\$5,000/MWH
	----- (\$1,000's) -----			
0.05	\$70	\$105	\$174	\$348
0.10	\$139	\$209	\$348	\$697
0.25	\$348	\$523	\$871	\$1,742
0.50	\$697	\$1,045	\$1,742	\$3,484

Shaded cells indicate situations where EDRP curtailment payments exceed event benefits

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Day-Ahead Demand Response Program



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DADRP Impact

Impact of DADRP on DAM Zonal Loads			
Zone	Hourly Average Event Value		Total DADRP Load (MWH)
	DADRP Load (MWH)	% Change in DAM Load due to DADRP	
Capital	3	0.2%	1,231
Western NY *	5	0.3%	1,463
Grand Total			2,694

* Central zone was only zone in Western NY with scheduled DADRP load

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DADRP Payments, LBMP Impact

- Figures do not include load reduction cost guarantees

NYISO Payments for DADRP Load		
Zone	Total DADRP Payments	% of Total
Capital	\$134,232	62%
Western NY	\$83,255	38%
Grand Total	\$217,487	

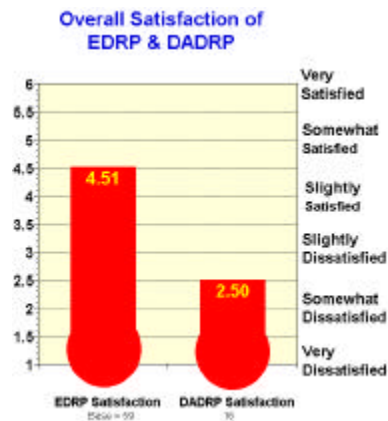
Impact of DADRP on DAM Zonal LBMPs			
Zone	Hourly Average Event Value		Total Collateral Benefits
	% Reduction in DAM LBMP due to DADRP	Collateral Benefits	
Capital	0.9%	\$2,781	\$1,029,049
Western NY *	0.3%	\$1,641	\$457,851
Grand Total			\$1,486,900

* Central zone was only zone in Western NY with scheduled DADRP load

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End-Use Customer Satisfaction



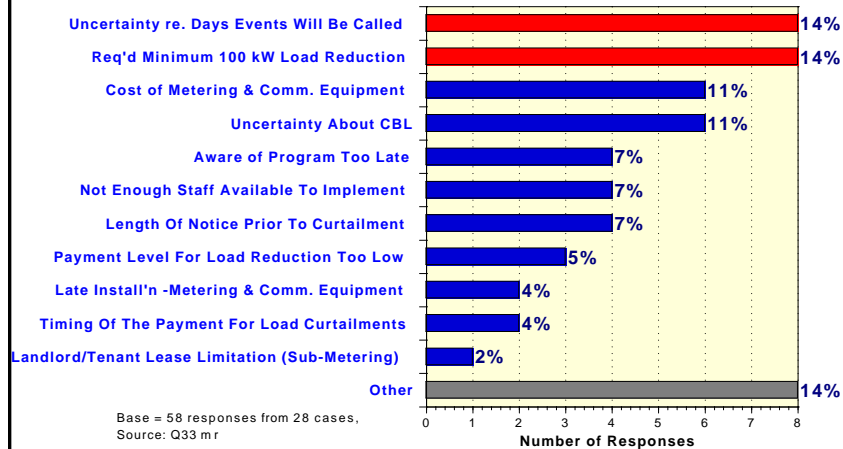
- Results from 53 program participant, 58 non-participant responses

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EDRP – Non-Subscribers

Reasons for Not Signing Up for EDRP



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Customer's w/ Firm Characteristics Odds of Participation in PRL Programs

Firm Characteristic	Odds Ratio
Understand Notice	2.4
Peak-12-4pm	3.6
Production Shifts	2.0
In Other LSE Program	3.4
EDRP Info Very Useful	0.3
% of Model's Correct Predictions	83
% of Model's Incorrect Predictions	16
$\text{Odds Ratio} = \frac{\text{Prob (Participation)}}{[1 - \text{Prob (Participation)]}}$	

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Revealed Preferences

- Indicators identifying customers well-suited to EDRP
- Important to market programs

Comparison of Evaluated PRL Programs		
Program Features	Base Program	Hypothetical Program
Payment	\$500/MW	\$500/MW
Penalty	0.0	0.1
Start Time	1300 HRS	1400 HRS
Notice	2 HRS	Noon Day-Ahead
Duration	4 HRS	4 HRS

Odds Ratios of Participation for EDRP Participants		
	Base Program	Hypothetical Program
Base Program	-	0.88
No Program	3.46	3.05

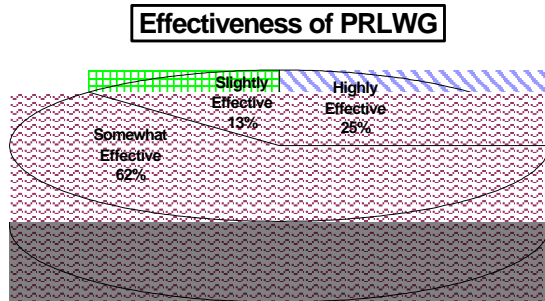
Odds Ratios of Participation for EDRP Non-Participants		
	Base Program	Hypothetical Program
Base Program	-	1.53
No Program	0.68	1.03

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LSE/CSP Survey

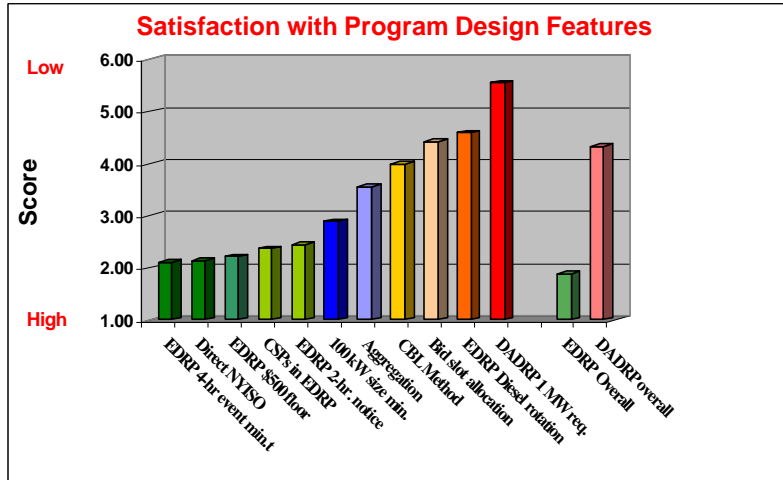
- Surveys completed by 6 LSEs and 3 non-LSEs



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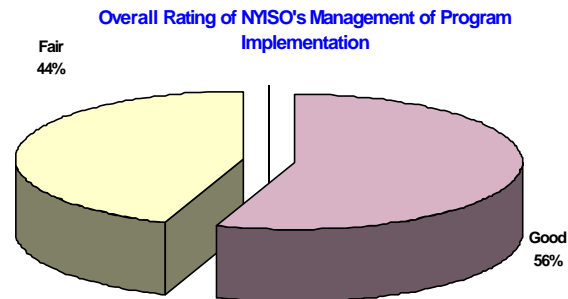
Program Satisfaction



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How Well Did the NYISO Implement Programs?



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Summary

	EDRP	DADRP
Total Participants	292	16
Total Subscribed Load	712 MW	134 MW
Max. Hourly Curtailment	425 MW	25 MW
Total Program Payments	\$ 4.2 Million	\$ 0.2 Million
Reliability Benefits to Payments Ratio	4.5:1 - 9.5:1	N/A
Collateral Benefits	\$ 13.0 Million	\$ 1.5 Million
Range in Avg. Reduction in LBMPs	0.50 - 1.42/MWH	0.12 - 4.12/MWH
Estimated Hedging Cost Benefits	\$ 3.9 Million	\$ 0.7 Million

- Executive Summary posted on NYISO website:
http://www.nyiso.com/services/documents/groups/bic_price_responsive_wg/demand_response/exec_summary_final.pdf