

**Customer Experience with Niagara Mohawk's
Competitive RTP Program:
*Interactions Between RTP and NYISO Demand
Response Programs***

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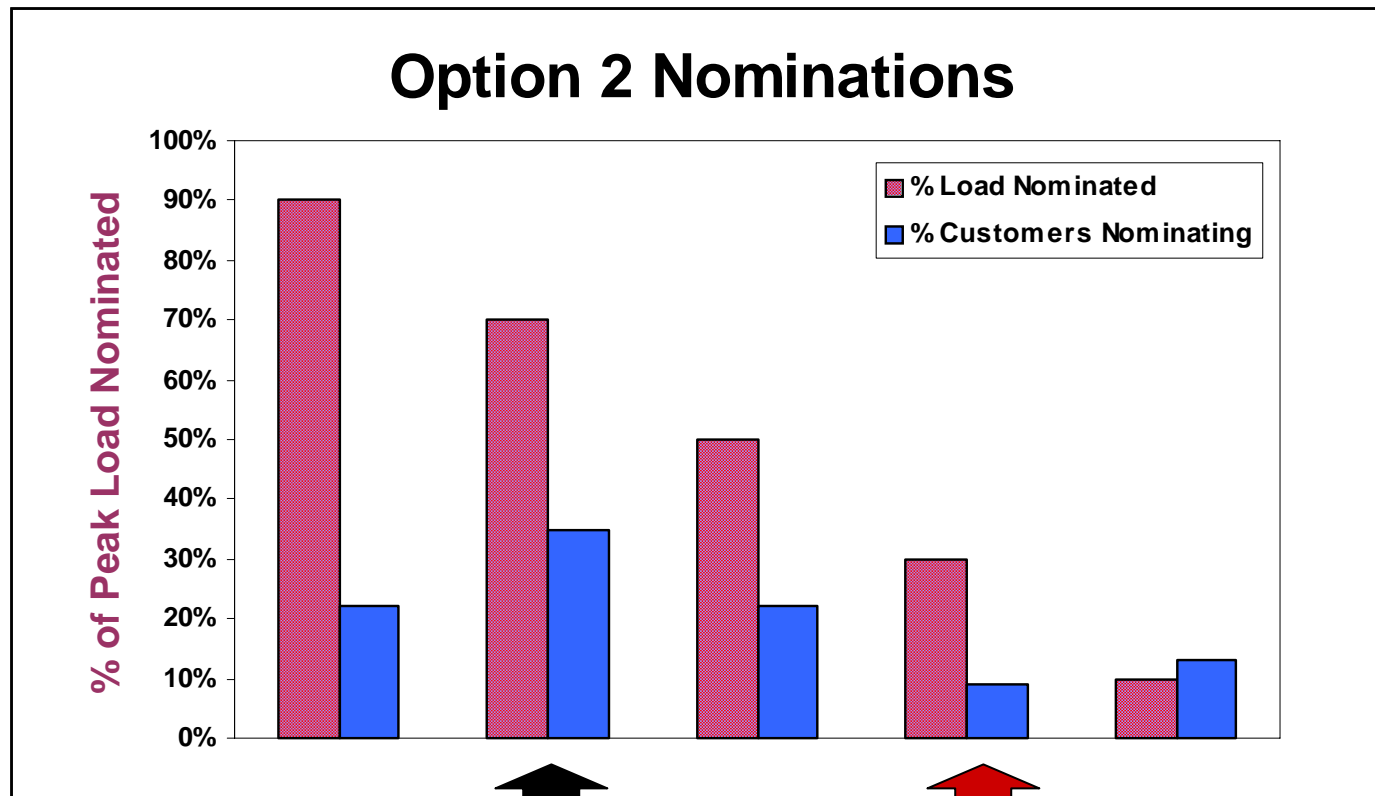
Outline of Presentation

- **SC-3A Tariff Details**
- **Who are the customers?**
- **Participation in NYISO DR programs**
- **Quantification of Price Responsiveness**
- **How much do they curtail?**
- **Key Findings and Policy Implications**

SC-3A Tariff Details

- **NMPC SC-3A tariff is default for C/I customers >2MW**
- **Unbundled charges for T&D, CTC, etc.**
- **Very small (2 mill) shopping credit**
- **SC-3A electricity commodity *Options***
 - **Option 1: RTP for commodity, indexed to DAM LBMP**
 - **Option 2: Fixed rate contract**
 - **Offered in 1998 open season**
 - **Take-or-pay on load nominated to plan**
 - **Nominated monthly peak and off-peak demand blocks for up to five years out**
 - **Opt-out provision at a premium payable upfront**
- **Customers can also purchase commodity service from competitive suppliers (including residual load on Option 2)**

Load Nominated to Option 2



**Most favored
nomination
60-80%**

**Least favored
nomination
60-80%**

SC-3 Population and Customer Response

Characteristic		Survey Respondents (N=53)	Study Population (N=149)
Business Type	Industrial	40%	30%
	Commercial	21%	22%
	Government /Educational	39%	48%

Survey respondents generally reflect the population

- **Industrial over-represented**
- **Govt/Ed under-represented**

Customer Survey: Competitive Supply Arrangements Chosen

	ISO Market Opening (winter 1998/99)	Summer 2001 (after first price spikes)	Current (summer 2003)
Number of customers reporting	44	44	44
Number of contracts that are...			
HEDGED:			
Flat Rate	7	3	4
TOU	6	6	6
Volumetric Collar	2	3	1
TOTAL HEDGED	15	12	11
NOT HEDGED:			
Price Index	2	5	9
NMPC SC-3A(Option1)	27	27	24
TOTAL NOT HEDGED	29	32	33
Percent of contracts that are hedged	34%	27%	25%
Percent with Financial hedge	15%	29%	30%

← Trend is away from physical supply hedges

Trend toward financial hedges



NYISO Demand Response Program Enrollment (2001-2003)

	Survey Respondents (N=53)	All SC 3A Customers (149 accounts)
DADRP <i>(economic)</i>	2%	<1%
ICAP/SCR <i>(reliability-capacity)</i>	13%	7%
EDRP <i>(emergency)</i>	38%	21%

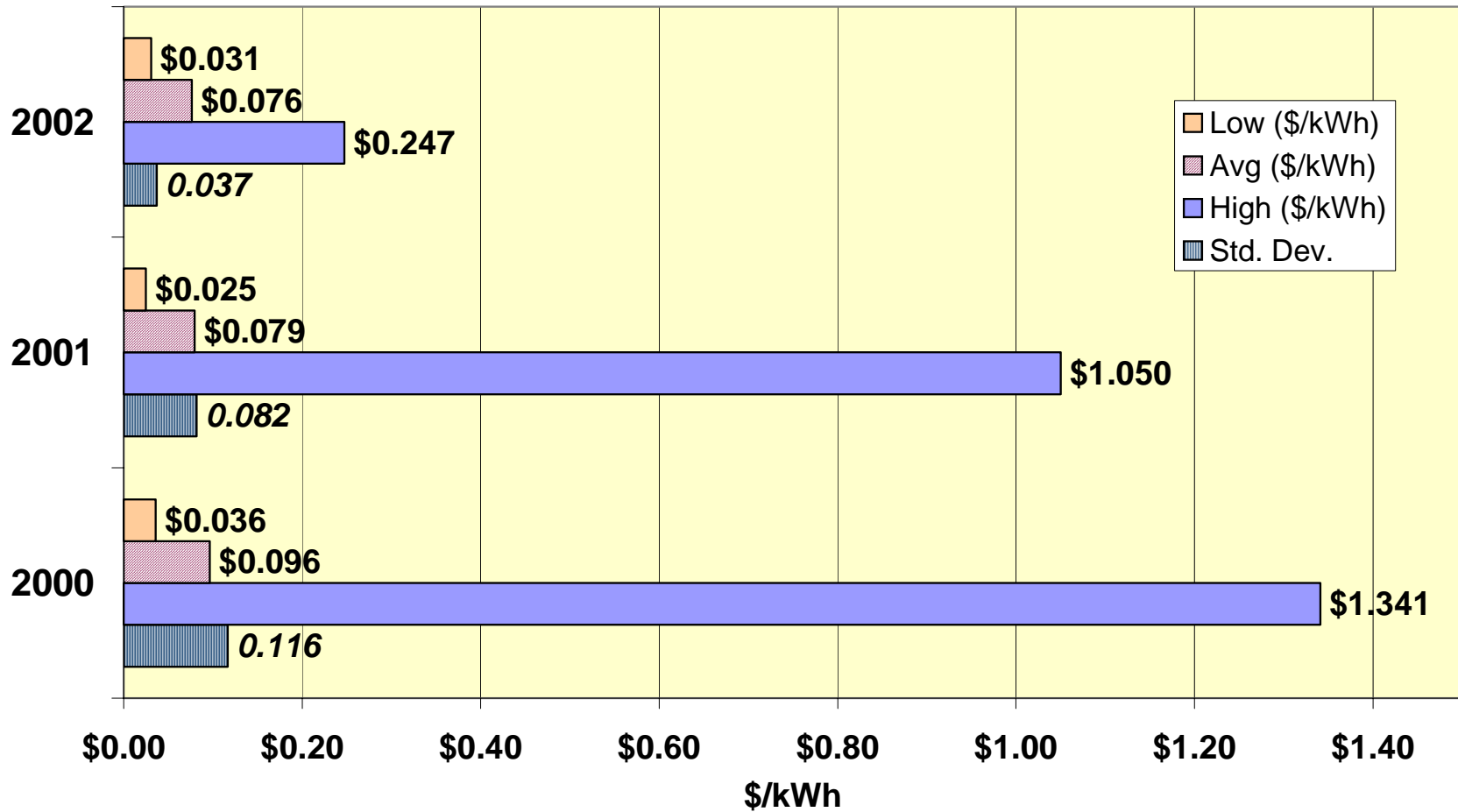
- Survey respondents nearly twice as likely to enroll in EDRP and ICAP as study population

Modeling Customer Demand

- **Firms assumed to minimize cost of electricity to meet output obligations (separability)**
- **Peak and off-peak usage modeled as alternatives (substitutes)**
- **Elasticity measures ability to adjust usage to relative price changes**
 - **%Change Peak/Off-Peak usage ratio**
for 1% Change in Off-Peak/Peak price ratio
- **Constant elasticity of substitution (response does not depend on nominal prices)**
- **Firm characteristics and circumstances (derived from survey answers) affect level of elasticity**
- **Peak defined as part of the modeling effort**

SC-3A Commodity Prices

Capital Zone, Transmission, Summer Weekdays, from 8AM – 6PM



Estimated *Average* Customer Substitution Elasticities by Business Class

Business Classification	Customer Count	% of Total Max Demand	Long Peak	
			Range	Avg.
Industrial	10	52%	-0.2 - 0.25	0.11
Commercial	9	23%	-0.15 - 0.25	0.00
Gov't / Ed	11	22%	0.04 - 0.52	0.30
Other	2	3%	-0.4 - -0.09	-0.37

- **Large range in average customer elasticities**
- **Gov't/Ed sector exhibit high level of price-responsiveness (Duke study confirms)**
- **Industrial sector exhibit moderate level of price-responsiveness (Similar to other studies: Duke, GP, NMPC, CSW)**
- **Commercial is totally unresponsive**

But, averages hide significant differences

Demand Model Characteristic Variables

Circumstances

- **Business classification**
(Industrial, Commercial, Gov't/Ed, & Other)
- **NYISO EDRP and Non-EDRP participation by business classification**
- **EDRP event days vs. non-event days by business classification**
- **Other NYISO PRL Program participation**

Other Influences

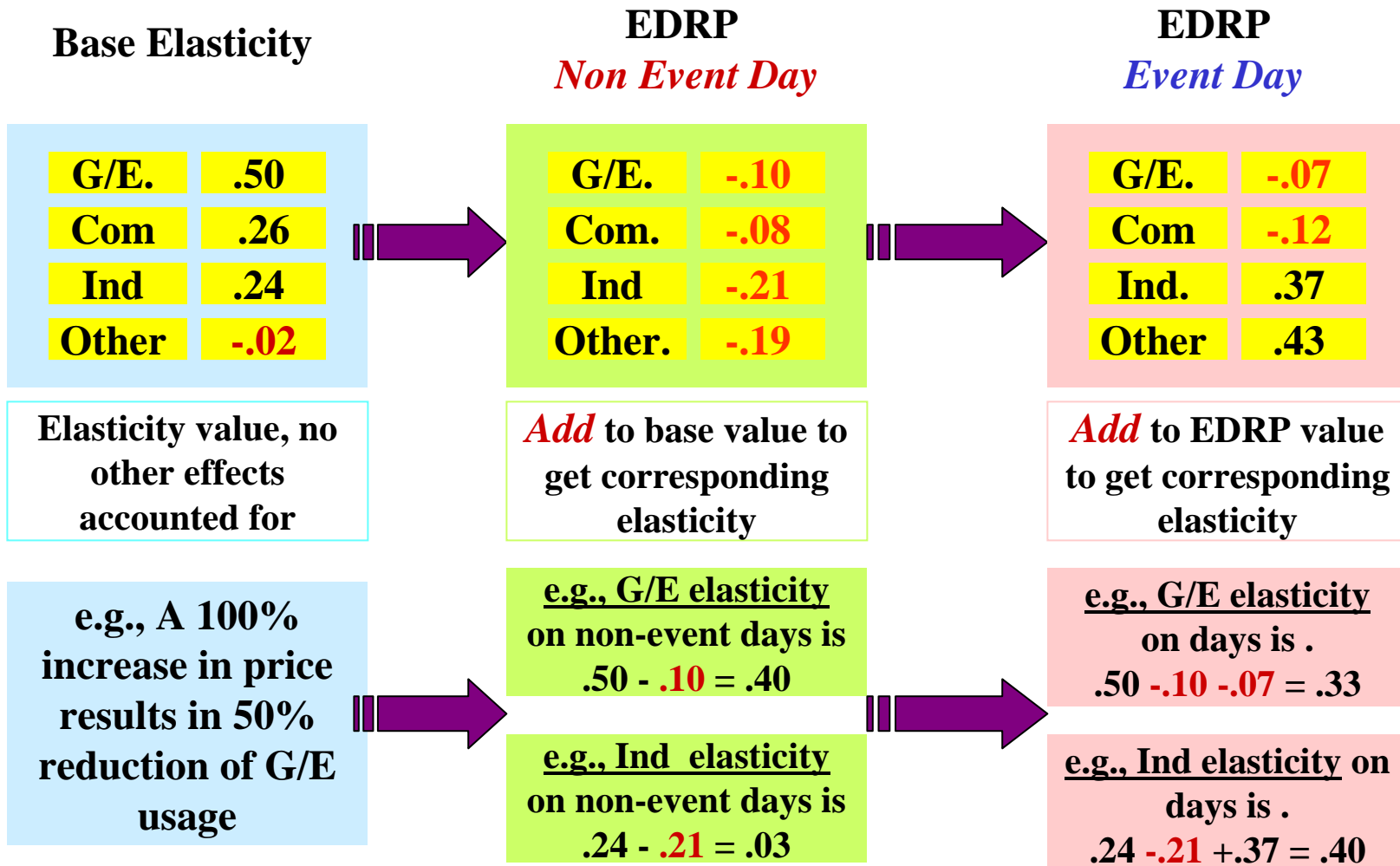
- ✓ **Peak usage in the afternoon**
- ✓ **Electricity cost > 10% of cost**
- ✓ **2001, year with highest overall volatility**
- ✓ **Technology investments (before and after 1998)**
- ✓ **Weather (hot days)**

Sorting out the influence of multiple effects on price elasticity

- ✓ **First, derive the *Base* substitution elasticities by business sectors**
- ✓ **Then, show the effect of *Circumstances*, participation in NYISO programs**
- ✓ **Then, show the effect of *other influences***

Elasticities by Customer Characteristics

Base plus EDRP



Elasticities by Customer Characteristics

Other DR Program Effects

Base Elasticity

G/E.	.50
Com	.26
Ind	.24
Other	-.02

EDRP Event Day

G/E.	.33
Com	.06
Ind.	.40
Other	.10

EDRP Non Event Day

G/E.	.40
Com.	.18
Ind	.03
Other.	-.31

Other DR Programs

ICAP/SCR	.16
DADRP*	.33

Base Elasticity

<u>G/E Example</u>	
Also ICAP/SCR =	.66
Also DADRP =	.58

EDRP Event Day

<u>G/E Example</u>	
Also ICAP/SCR =	.49
Also DADRP =	.66

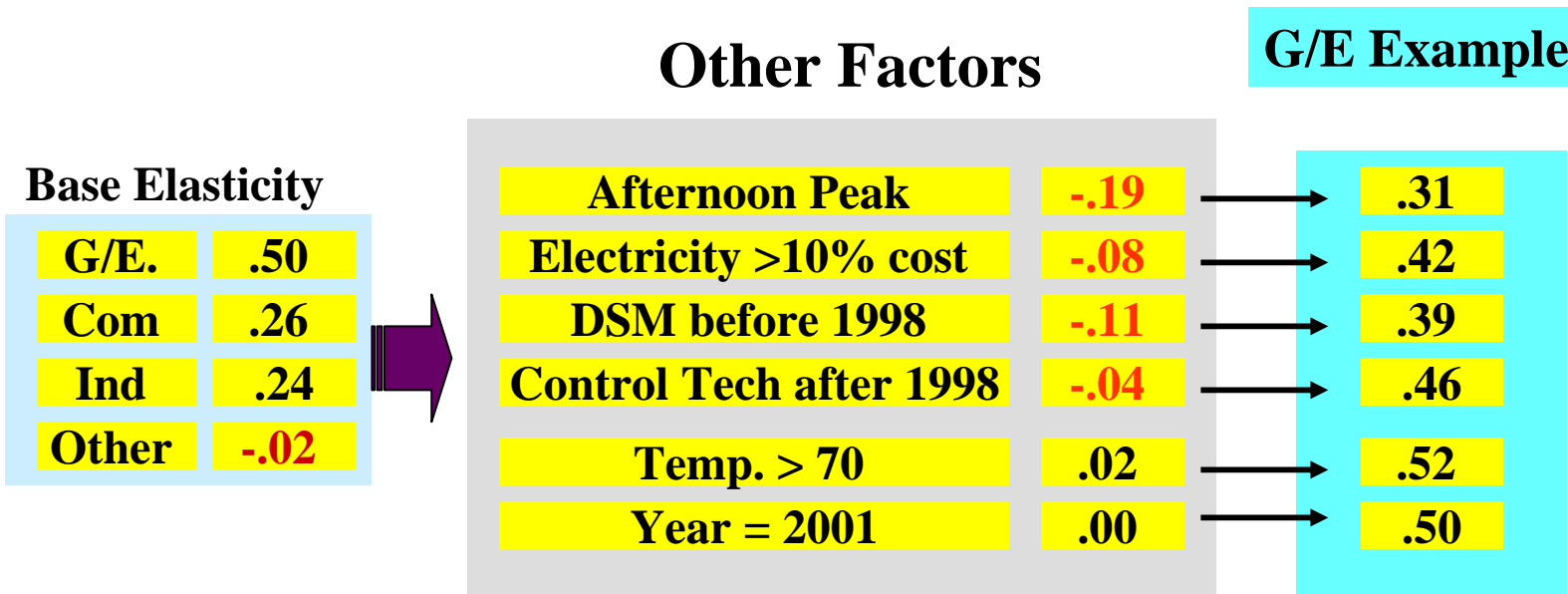
EDRP Non Event Day

<u>G/E Example</u>	
Also ICAP/SCR =	.56
Also DADRP =	.73

*These are
also additive
effects*

Elasticities by Customer Characteristics

Effects of Other factors



These are also additive effects

Estimating Peak Load Reductions

- ❑ **CES demand model assumes firms *shift* usage from peak to off-peak**
 - ❑ 15% report shifting
 - ❑ But, 35% customers report reducing discretionary load, a form of conservation
- ❑ **Solution: identify which load is *shifted* and which is *foregone or conserved***
 - ❑ Shifting implies peak and off-peak use are substitutes – reducing peak requires increasing off-peak usage
 - ❑ **Conservation implies they are complements -reducing peak results in also reducing off-peak**

Estimated Response Behavior Index

Values by Sector

	Base	Marginal Effects			Overall Range
		EDRP	DADRP	SCR	
Ind	.66	.95	.15	.31	.50 - .92
Com	.71	1.0	.20	.36	.64 - 1.00
G/E	.68	.97	.17	.33	.64 - 1.09
Other	.83	1.12	.32	.48	.80 - .98

- Behavior Index

0=All Shifting (substitutes)

1=All Conservation (complements)

- Average scores show tendency toward complementarity
- EDRP increases conservation behavior
- DADRP and SCR increase substitution behavior

Response Behavior Index

Customer characteristics and circumstances that ..

Increase shifting

Peak Usage Noon – 5 PM

Electricity Cost > 10%

DADRP Participation

ICAP/SCR Participation

- Well-defined, batch-type processes
- Already rely on controls to reduce kW costs

Increase conservation

Investment Prior to RTP

Investment After on RTP

EDRP Participation

- May have leveled peaks
- Lack control to shift
- Conservation ethic may predominate

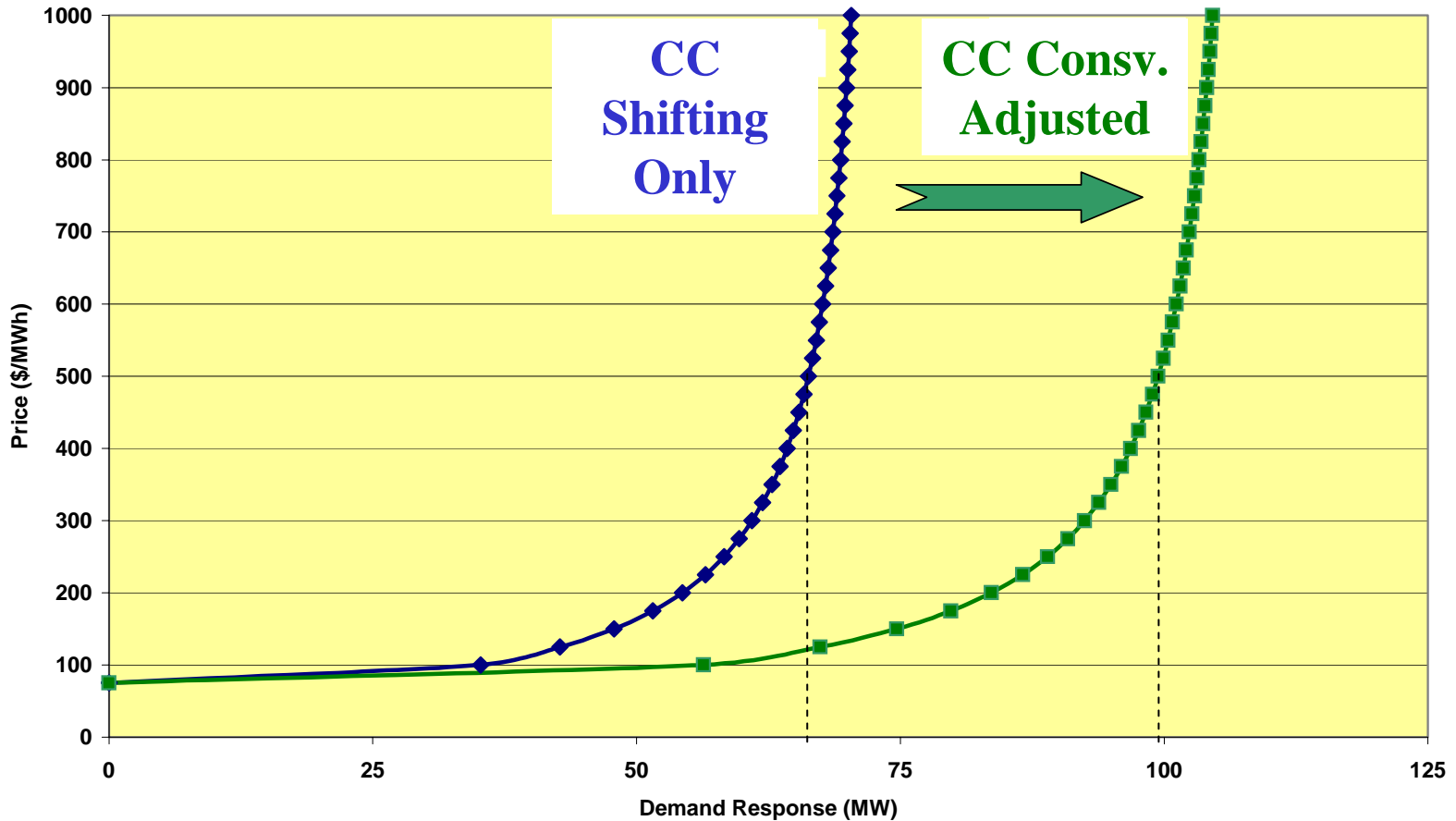
Response Behavior Summary

- **Why the strong conservation effect?**
 - ❖ **We are not accounting for inter-day shifting**
 - ❖ **Indivisibilities prevent precise load shaping in response to high prices of relatively short duration**
 - ❖ **Peak and off-peak usage are complements by nature in some circumstances, for some uses (the own-price effect of Puget and California)**
 - ❖ **NYISO effect – ICAP and EDRP are not seen as price responses, but state-specific adaptations**
 - ❖ **Partially good citizenship**
 - ❖ **Someone else makes the curtailment decision**
 - ❖ **Limited and special circumstances, unlike everyday SC-3A prices**

Estimated SC-3A Curtailment Curve

Conservation Effect

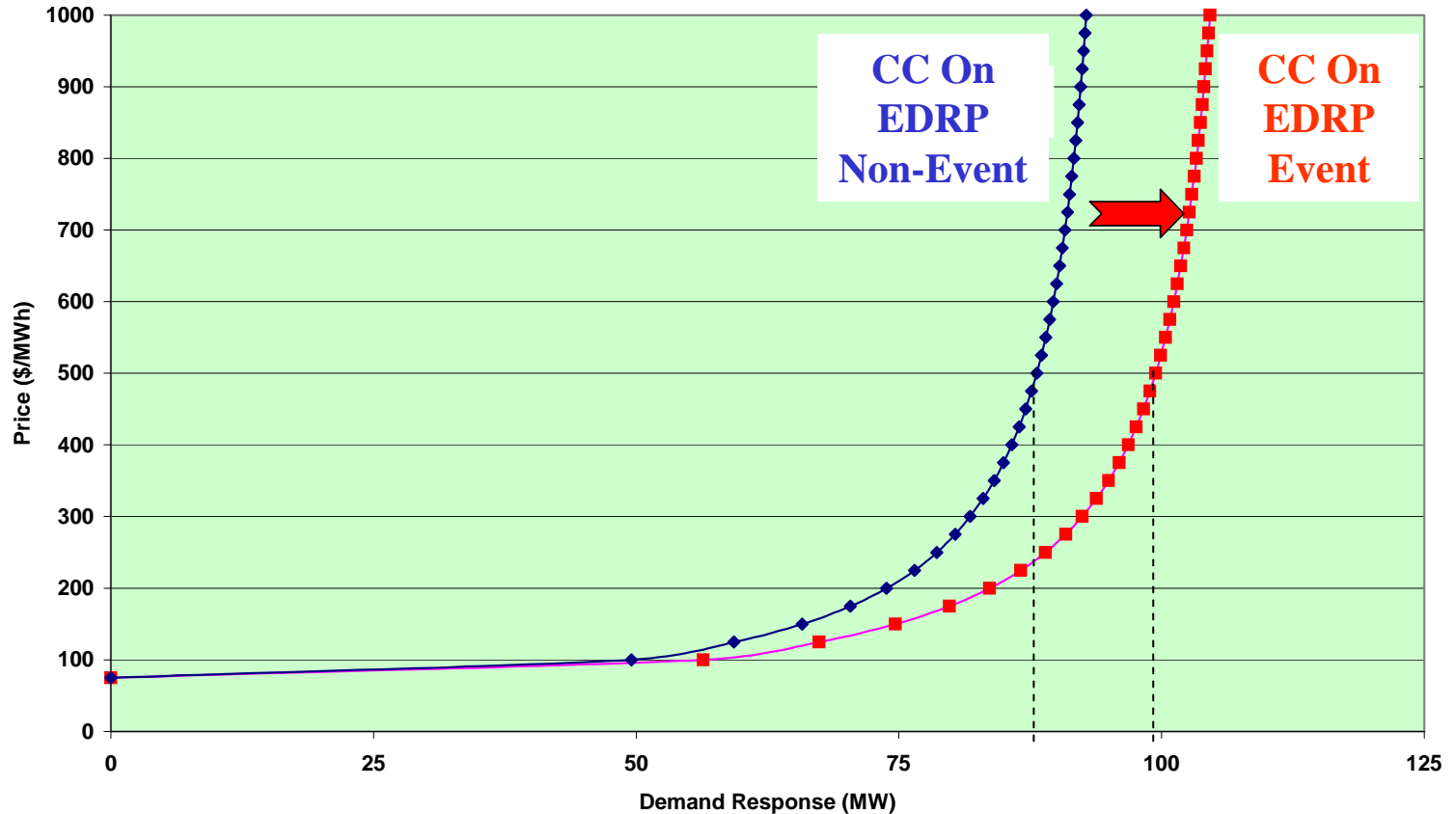
SC-3A Curtailment Curves
Shifting and Conservation Effect Adjusted



Estimated SC-3A Curtailment Curve

EDRP Effect

SC-3A Curtailment Curves
EDRP Event vs. Non-Event Days



Key Findings

- **Demand Response Potential**
 - **Half (54%) of survey customers claimed they cannot respond to prices, *however 30% are enrolled in a NYISO DR program***
 - **Average elasticity similar to other studies, but there are important differences among customer circumstances**
 - **Those who self-selected onto EDRP are actually less price-responsive on non-event days**
 - **During an EDRP event, Industrial customers provide large reductions atypical of their SC-3A response**
 - **Other NYISO DR programs are complements – participant response is higher**

Policy Implications

- ✓ **Customer's diverse circumstances make all the difference in RTP response**
 - ✓ **The greatest naturally occurring response is Govt/Ed**
 - ✓ **Afternoon use and cost intensity work against responding**
 - ✓ **Not all peak reductions are the same- shifting versus conserving have different implications for customer savings, event snap-back**
- ✓ **The market for hedges still evolving, slowly and out of synch with conditions**
 - ✓ **Many customers interested in hedging price risks, but unwilling to pay large price premiums, given market expectations**
- ✓ **NYISO DR programs elicit response that RTP does not**
 - ✓ **Particularly for industrial customers**