

*Does RTP Deliver Demand Response?:  
Case Studies of Niagara Mohawk RTP and  
~43 Voluntary Utility RTP Programs*

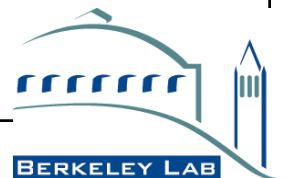
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**Mid-Atlantic Demand Response Initiative Meeting**

**Baltimore, MD**

**December 10, 2004**



# Outline of Talk

- Case Study of NMPC RTP Tariff
  - Customer Satisfaction and Choices
  - Does RTP deliver demand response?
  - How do RTP and DR programs interact?
  - Policy Implications
- Review of Voluntary RTP Programs

# Voluntary vs. Default Service RTP: Overview of Key Design Issues

	<b>Voluntary</b>	<b>Default</b>
<b>Objectives</b>	Customer retention, load growth, DSM	Encourage switching; minimize risk for default service provider
<b>Tariff Design</b>	Two-part with CBL; day-ahead price quotes	RTP for commodity with unbundled T&D charges; real-time price quotes
<b>Marketing</b>	Targeted to largest customers, often through account reps	N/A
<b>Customer Education</b>	Occasionally offered by utilities (e.g., workshops or meetings with account reps)	Incorporated into more general informational campaigns about retail choice
<b>Financial Hedging Options</b>	CBL and/or utility-sponsored financial risk mgmt. products	Potentially offered by competitive retailers
<b>Tech. Assistance &amp; DR Technologies</b>	Occasionally offered by utilities	Potentially offered by competitive retailers

# Project Objectives

- Characterize customer response to and satisfaction with a RTP tariff in a retail competition environment
- Quantify price response
- Assess interactions between RTP and ISO/utility DR programs
- Provide input to CA and NY regulators/stakeholders developing DR and RTP options

# NMPC Market Situation

- RTP is the default tariff for the “SC-3A” class (large C/I customers >2MW) since late 1998
- Unbundled charges for T&D, CTC, etc.
- Customer Choices for Electric Commodity Service
  - NMPC Option 1: RTP indexed to NYISO DAM – default option
  - NMPC Option 2: fixed rate contract – one-time availability at program inception (now expired)
  - Competitive retail supplier (ESCO)
- Several ISO-based DR programs
  - Emergency Demand Response Program (EDRP): pay-for performance
  - Installed Capacity (ICAP): reservation payment
  - Day-Ahead Demand Response Program

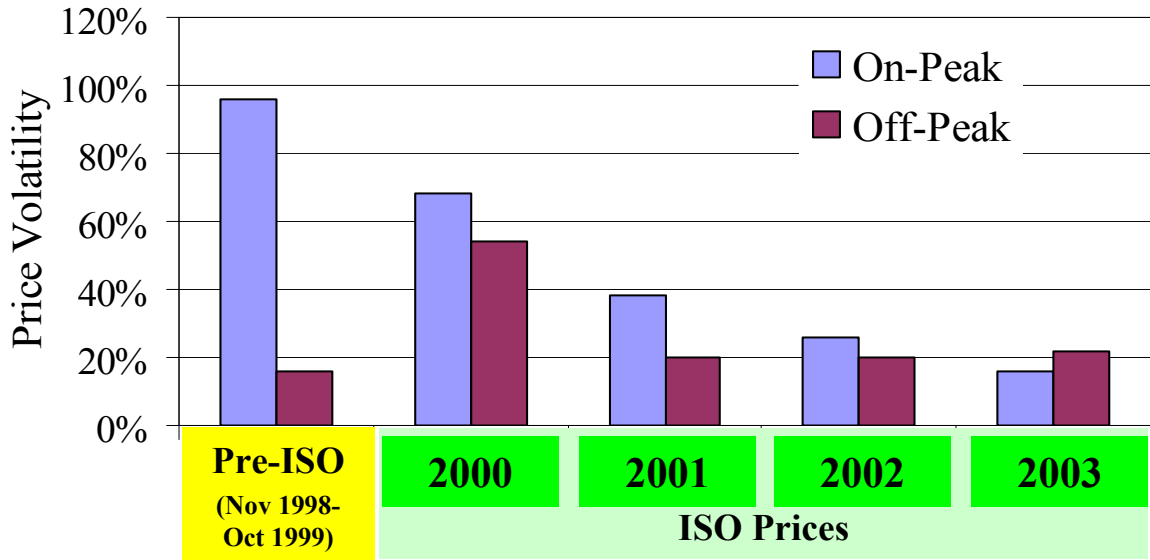
# Survey Respondent and Population Characterization

<b>Customer Characteristics</b>		<b>Survey Respondents</b> (53 customers; 60 accounts)	<b>All SC-3A Customers</b> (130 customers; 149 accounts)
<i>Business Type</i>	<i>Industrial</i>	40%	32%
	<i>Commercial</i>	21%	23%
	<i>Government/educational</i>	40%	46%
<i>Average monthly maximum demand</i>		3.0 MW	3.4 MW
<i>Option 2</i>		9%	18%

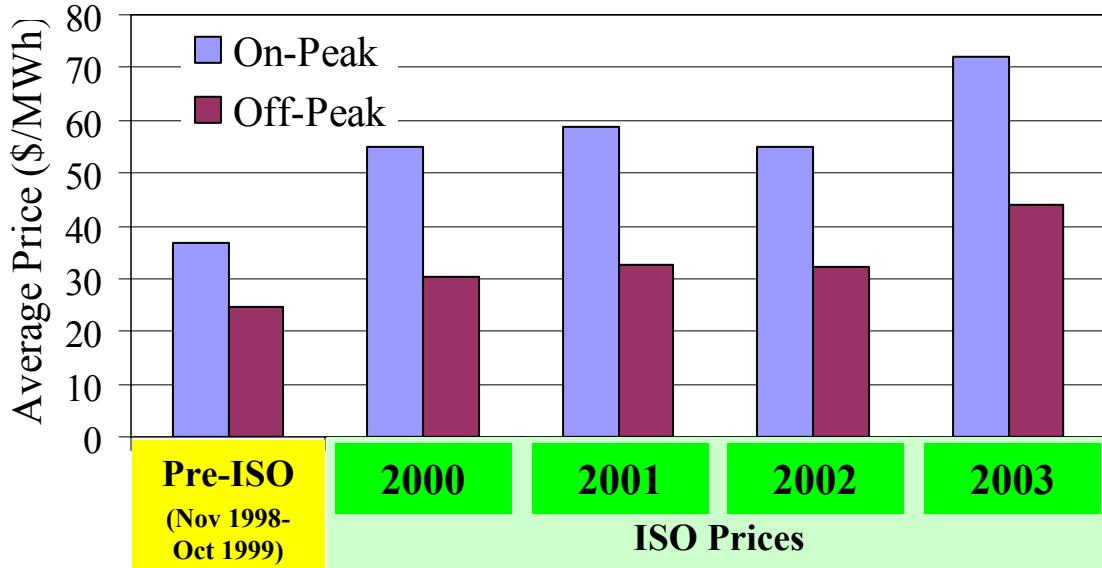
The survey response rate was about 40%.

Industrials are over-represented in the survey sample; institutional customers are under-represented.

# Declining Volatility, Increasing Average Prices

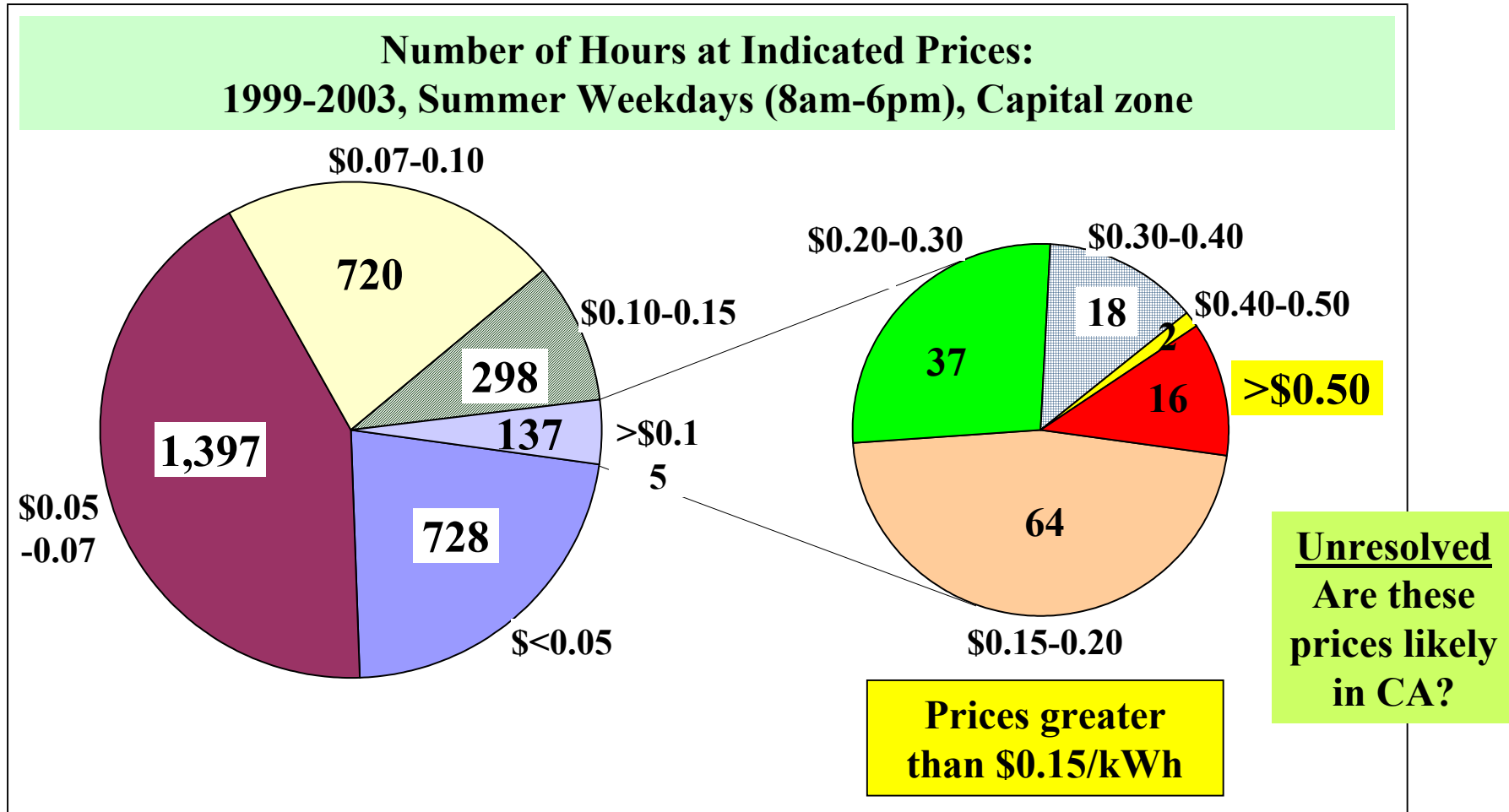


- Similar trends in all NMPC load zones; although prices are somewhat higher in Capital zone (Central zone shown here)



\*On-Peak defined as 7am-11pm on weekdays

# Customers Have Seen Occasional High Prices

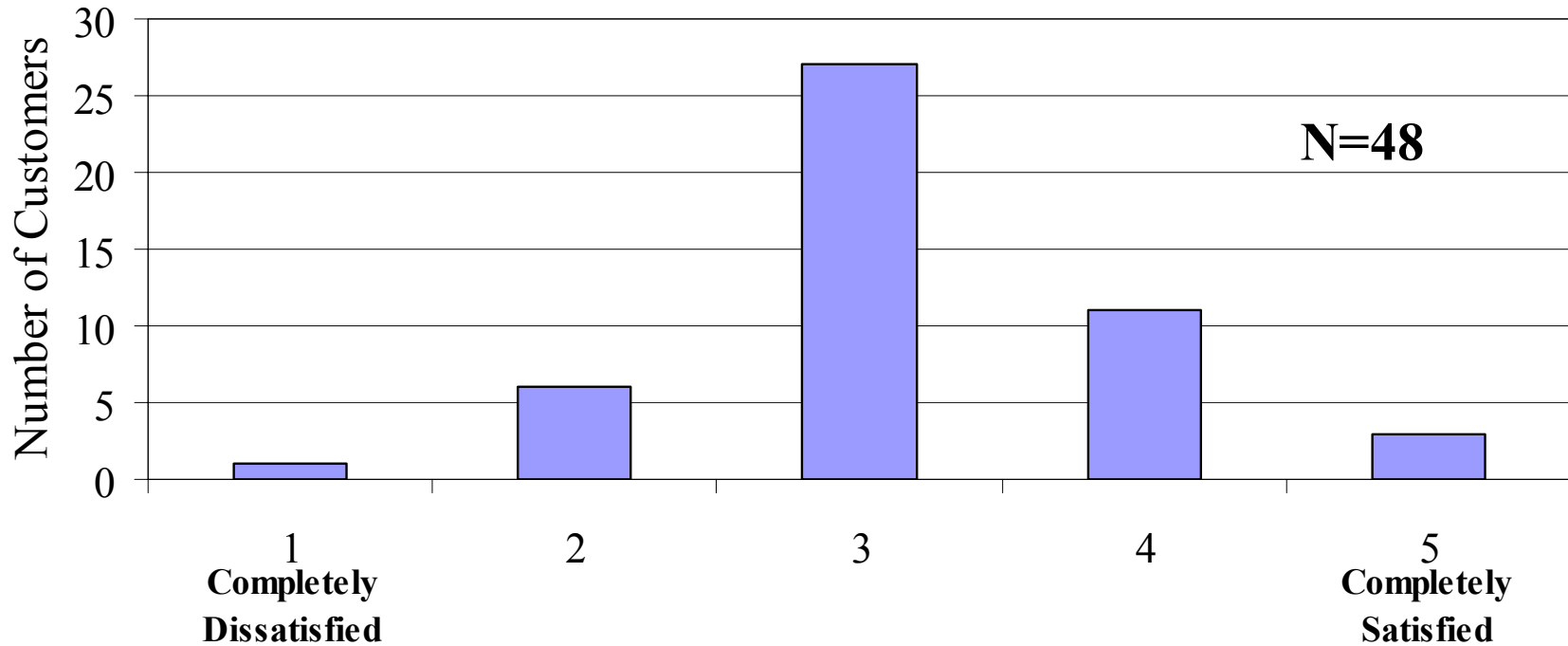


- 137 hours over 4 summers with prices above \$0.15/kWh
- Prices exceeded \$0.50/kWh for 16 hours



# Customer Satisfaction and Choices

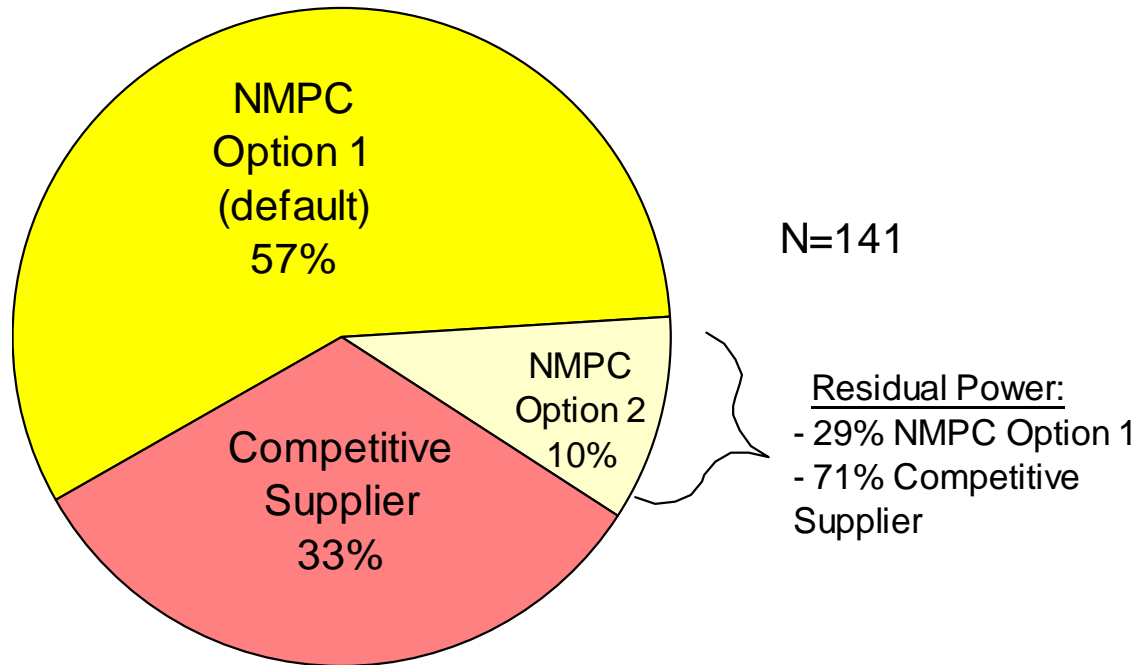
# Survey Respondents' Satisfaction



Customer Satisfaction with 1998 Redesign of SC-3A

- Customers are relatively satisfied with the tariff
- Interviews reveal greater disappointment with limited offerings by competitive retailers

# Supply Choices of SC-3A Population (December 2002)



**Late 2004 Update:**


- **>60% of customers have now switched to competitive suppliers**
- **Driven in part by sunset of Option 2 hedge**

- 53% of SC-3A customers indicated that they had taken competitive supply at some time since 1998
- **But does switching mean hedged?**

# Customer Survey: Competitive Supply Arrangements

	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...			
<b>HEDGED:</b>			
Flat Rate	7	3	4
TOU	6	6	6
Volumetric Collar	2	3	1
<b>TOTAL HEDGED</b>	<b>15</b>	<b>12</b>	<b>11</b>
<b>NOT HEDGED:</b>			
Price Index	2	5	9
NMPC SC-3A(Option1)	27	27	24
<b>TOTAL NOT HEDGED</b>	<b>29</b>	<b>32</b>	<b>33</b>
<b>Percent of contracts that are hedged</b>	<b>34%</b>	<b>27%</b>	<b>25%</b>
<b>Percent with Financial hedge</b>	<b>15%</b>	<b>29%</b>	<b>30%</b>

Trend is away from physical supply hedges



Trend toward financial hedges

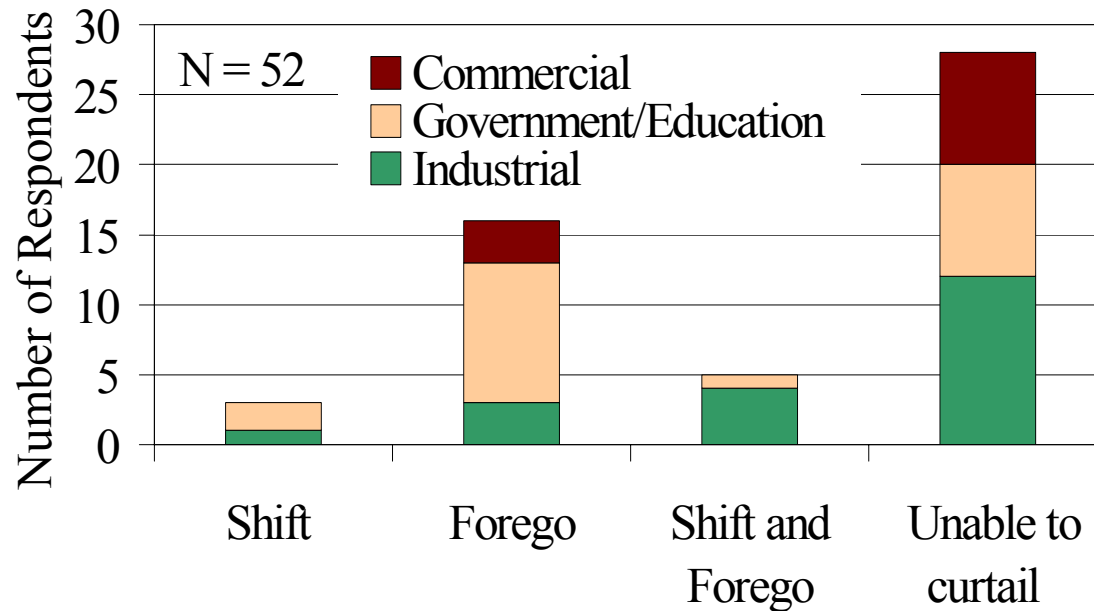


# Key Findings: Hedging

- In 2003, at least 65% of customers were fully exposed to RTP
- Why do customers not hedge more? Possible explanations:
  - Customers are **sophisticated** – they understand risks and still choose not to hedge
  - Customers are **discouraged** – retail market offers are hard to find or too expensive
  - Customers are **not fully aware of the risks** – declining volatility in recent years
  - Customers have **chosen not to choose** – default RTP service
- **Tariff Design and Retail Competition**
  - Unbundled RTP tariff design is appropriate for a competitive market structure, so long as there is a robust market for hedges
  - A utility-offered hedge (e.g., Option 2) is an appropriate transition strategy

Does RTP Deliver DR?

# Price Response: What Customers Told Us

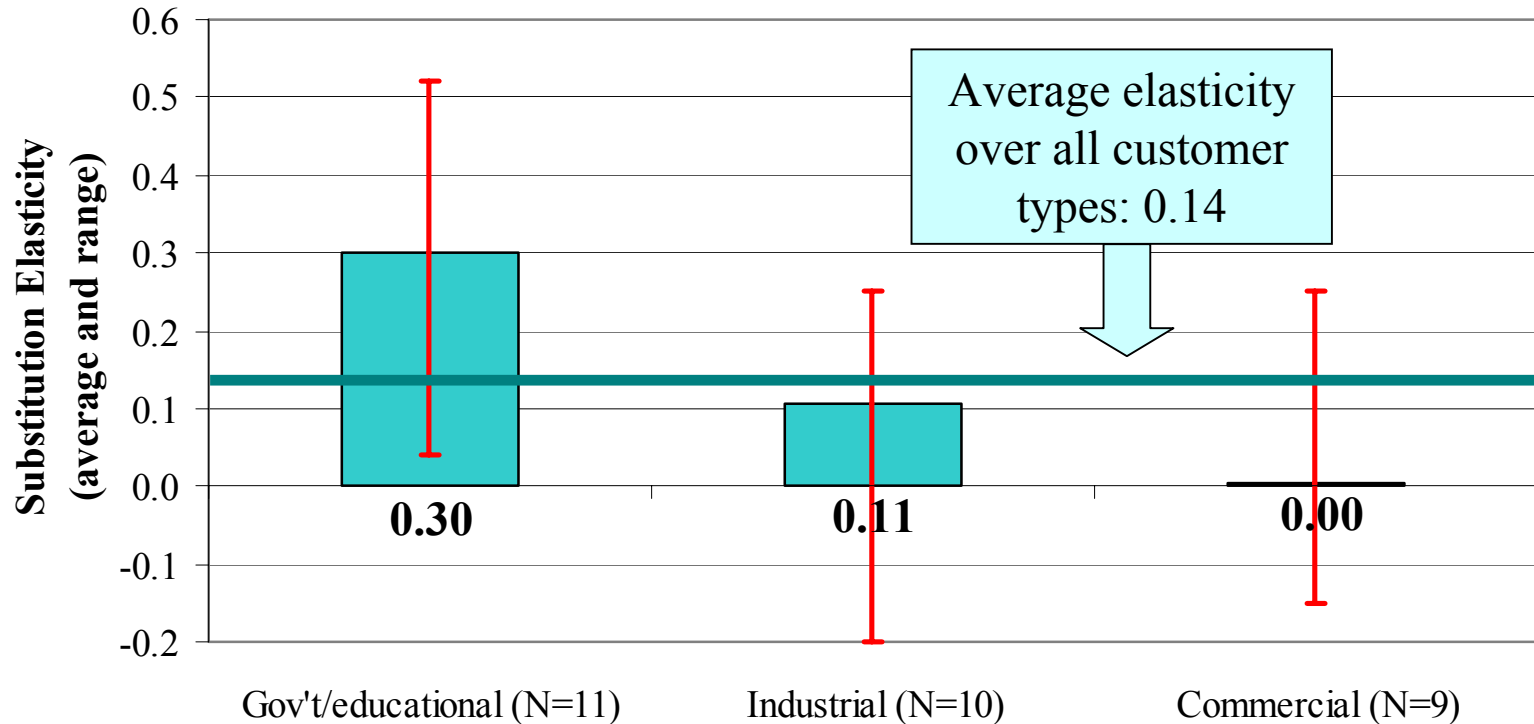


## Unresolved

Do customers make a distinction between RTP price response and responding to ISO-declared curtailment events?

- 31% say they FOREGO usage (mainly govt/education customers)
- ~15% say they can SHIFT from on-peak to off-peak
- 54% of survey respondents claim they CANNOT CURTAIL
  - but 30% of them were enrolled in NYISO DR programs
- Customers may make a distinction:
  - RTP is price response
  - ISO programs are a call to keep the lights on (civic duty)

# Price Response: Estimated Substitution Elasticities



- Large range in average customer elasticities:
  - Gov't/educational customers are most price responsive
  - Industrial sector response is moderate
  - Commercial sector is unresponsive



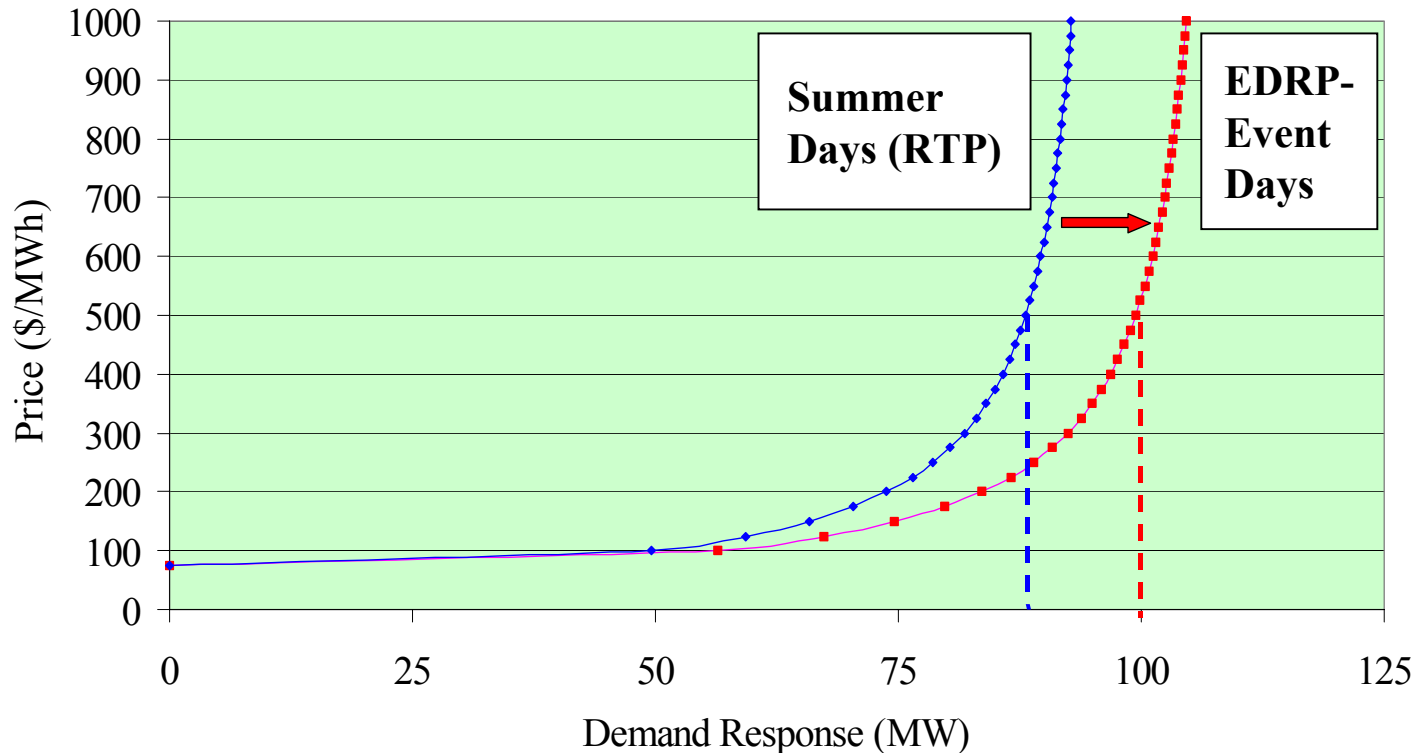
How do RTP and DR Programs Interact?

# NYISO Demand Response Program Enrollment (2001-2003)

<b>NYISO DR Program</b>	<b>Survey Respondents</b> (53 customers; 60 accounts)	<b>All SC-3A Customers</b> (130 customers; 149 accounts)
EDRP <i>(emergency)</i>	38%	28%
ICAP/SCR <i>(reliability-capacity)</i>	13%	9%
DADRP <i>(economic)</i>	4%	1%

Survey respondents were 30-40% more likely to participate in NYISO DR programs than the SC-3A study population

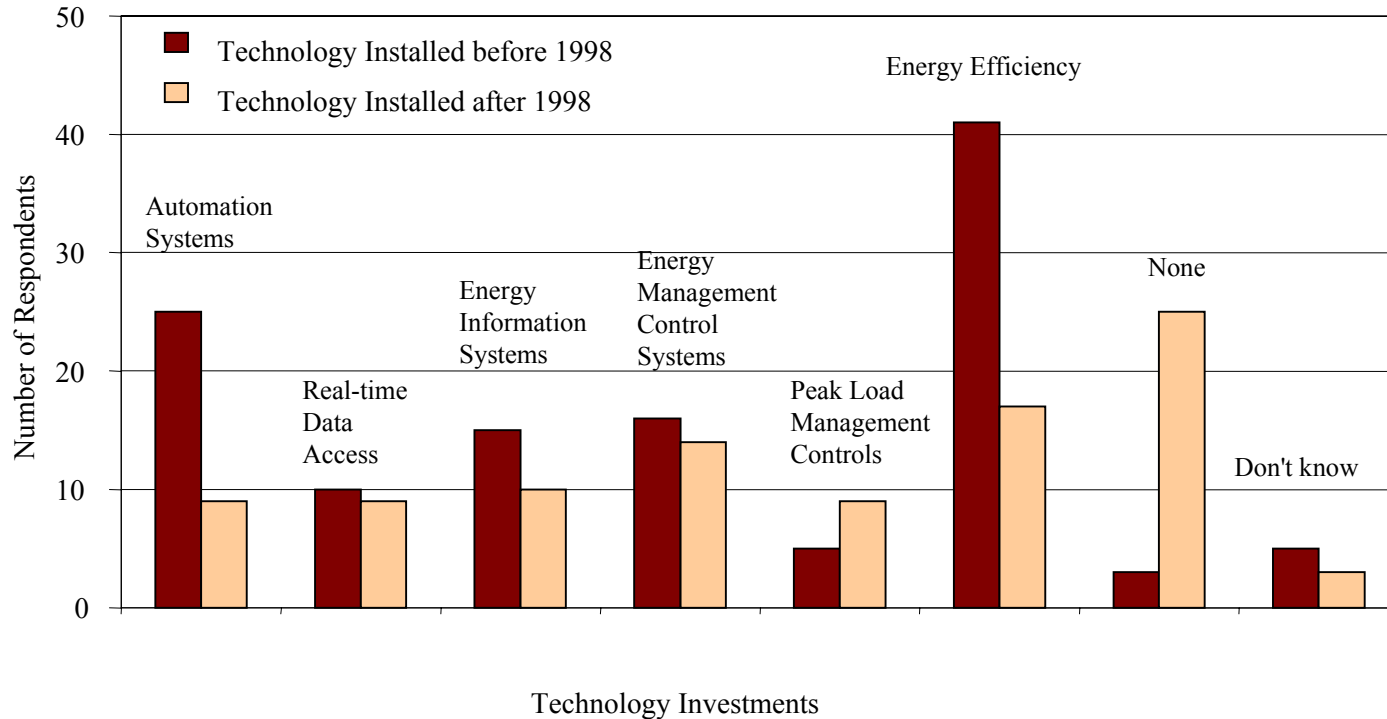
# Estimated Aggregate Demand Response: RTP and EDRP



- DR potential of SC-3A customers is ~100MW – about 18% of their total maximum demand
- SC-3A customers in NYISO Emergency DR program, mainly industrials, provide ~15MW of load curtailment

Do Enabling Technologies Help?

# Customer Survey: Technology Adoption



- Technology adoption prior to 1998 was heavily efficiency oriented – reflecting aggressive NMPC DSM expenditures
- 45% of customers have invested since 1998 – emphasis toward load management-oriented devices – reflecting NYSERDA program incentives
- Customers are not fully aware of response strategies, even when they have equipment

# Actions Taken in Response to High Prices

Actions Taken by 24 Customers with Response Capability	N	Stated Response Capability		
		Shift	Forego	Both
None	3		●	
Started onsite/backup generation	1		○	
Asked employees to reduce usage	17	●	●	●
Turned off or dimmed lights	10		●	●
Reduced/halted air conditioning	15	○	●	○
Reduced/halted refrigeration/water heating	2		○	
Reduced plug loads (e.g., office equipment)	3	○	○	
Shut down plants or buildings	3		○	○
Halted major production processes	2		○	○
Altered major production processes	4	○	○	○
Shut down equipment	12	○	●	●
Other	7		●	

○ 1-2 respondents  
● 3 or more

- Relatively **low-tech** responses, mostly shutting off equipment or asking users to reduce usage
- Only one customer indicated using onsite generation

# Key Findings

- Customers are generally satisfied with default day-ahead RTP
  - Despite views expressed by some that hedging options are expensive relative to perceived risks
  - ~45% of customers remained on default RTP; many others fully or partially exposed to day-ahead prices
- Price response is modest overall
  - Government/educational customers are most responsive
  - Average elasticity (0.15) comparable to other studies' results
  - Aggregate DR potential is ~100MW at high prices
  - Most response involves reducing discretionary loads – technology has a limited impact
- ISO DR programs complement RTP
  - Industrial customer response to DR programs is greater than for RTP

# Implications for Other States

- Results challenge conventional wisdom about which customers are most likely to respond
  - Institutional customers can provide significant price response
  - Some customers respond to *day-ahead* hourly prices
- RTP is best implemented as part of a portfolio of options
  - Emergency DR programs can complement RTP
  - Ensure adequate hedging options exist, at least initially
- Targeted customer education and technical assistance are needed to realize customers' inherent price response potential
  - Many customers are not aware of available price response technologies and strategies
  - Even more important if RTP is extended to smaller customers



# Implications for Other States (cont'd)

- It will take time to develop RTP price response
  - Initial response for most customers is discretionary (not shifting), which limits:
    - The number of customers willing to participate
    - The amount of peak demand participants will curtail
  - How many customers already have the capability to shift load? At what price?
- Probably quicker to build DR capability with utility or ISO DR programs
  - Limited, voluntary exposure is a big plus to many customers
  - Easier to sell because of public duty aspect of ISO-declared events

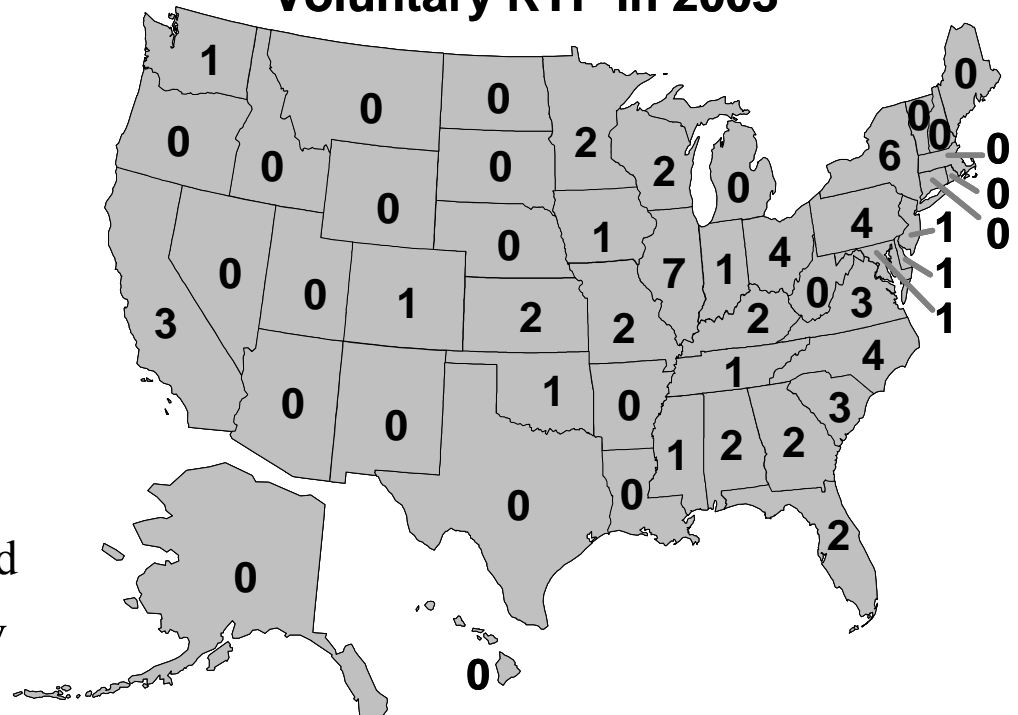
# Survey of Utility Experience with Voluntary RTP Programs

- Summarized 43 voluntary RTP programs offered in 2003
  - “voluntary RTP” defined to exclude default service rates
  - Investor-owned and large publicly-owned utilities
- Interviewed utility program managers and reviewed publicly available sources (program evaluations, tariff sheets, regulatory filings, etc.)
- Identified key trends related to:
  - Utilities’ motivations for offering RTP
  - Tariff design features
  - Program participation
  - Participant price response
  - Program status and outlook
- Developed recommendations for policymakers interested in voluntary RTP as a strategy for developing demand response

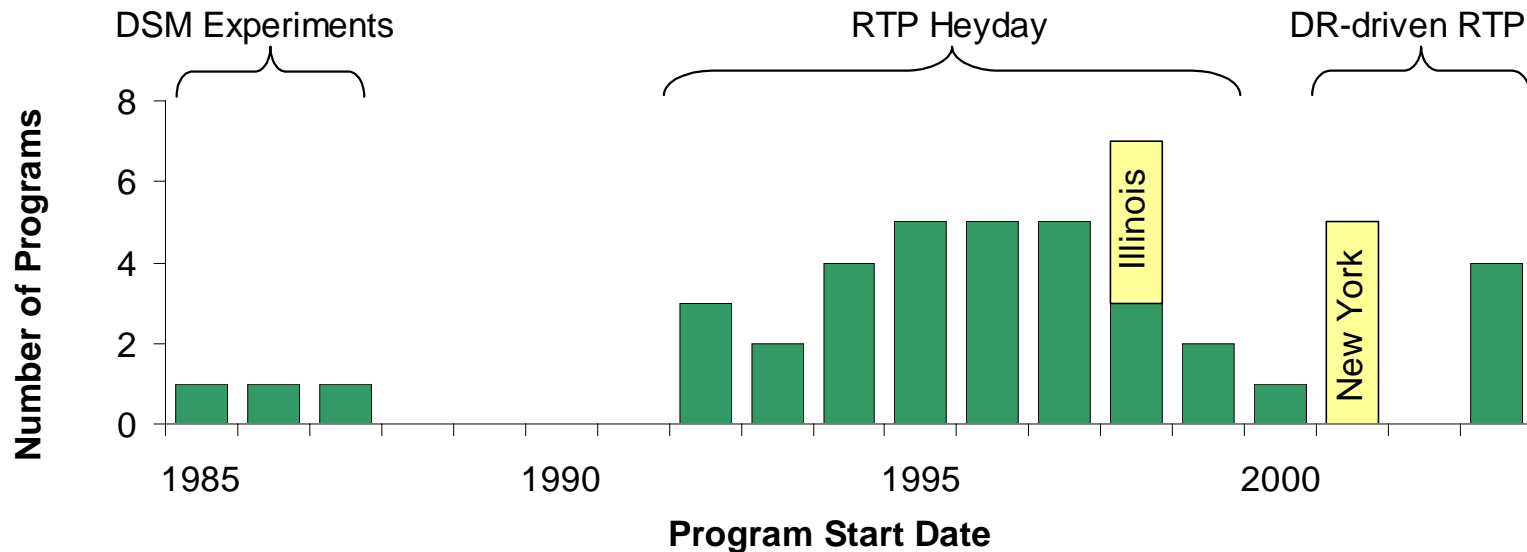
# The Geography of Voluntary RTP

- Voluntary RTP offered by:
  - Most IOUs in the Southeast and TVA
  - All IOUs in Illinois and NY, per statutory/ regulatory requirement
  - First Energy-owned utilities in OH (4) and PA (3)
  - Several other Midwestern IOUs: Cinergy, Xcel, KCPL
  - All CA IOUs in 2003, but two programs since cancelled
- Voluntary RTP not offered by many utilities in:
  - The West
  - New England

**Number of Utilities in Each State with Voluntary RTP in 2003**

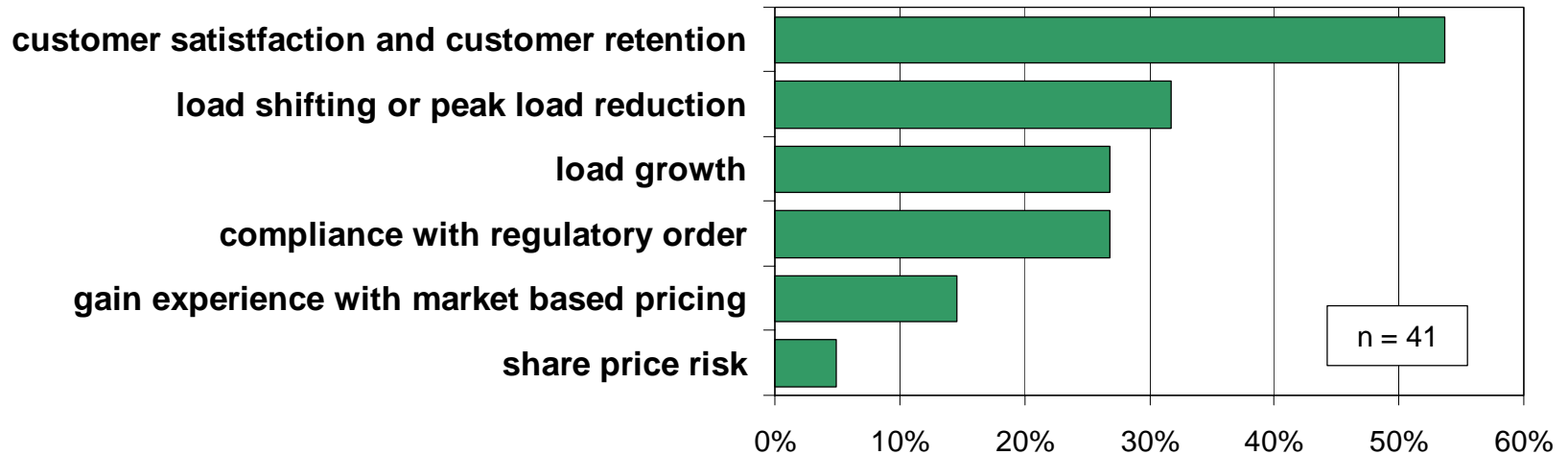


# Timeline of RTP Program Offerings



- **Mid-1980s**: RTP introduced by several utilities as novel DSM strategy
- **1990s**: RTP adopted by many utilities in Southeast and Midwest
  - Interest subsided in late-90s, as restructuring takes center stage
- **2000-2003**: RTP “rediscovered” as a tool for DR and a remedy for ailing electricity markets

# Utility Motivations for RTP

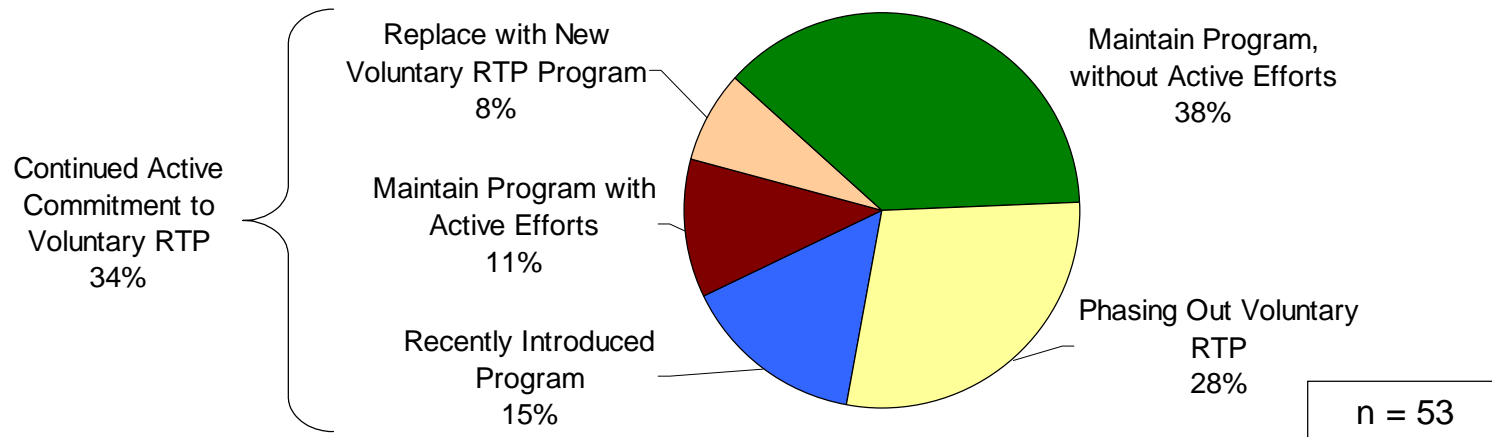


\* Some utility program managers identified multiple motivations; thus, percentage values for all categories add to more than 100%

Percentage of RTP Programs\*

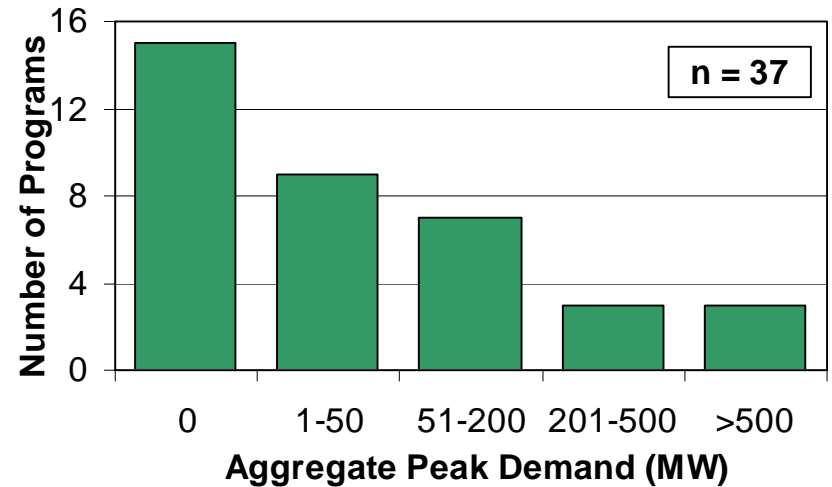
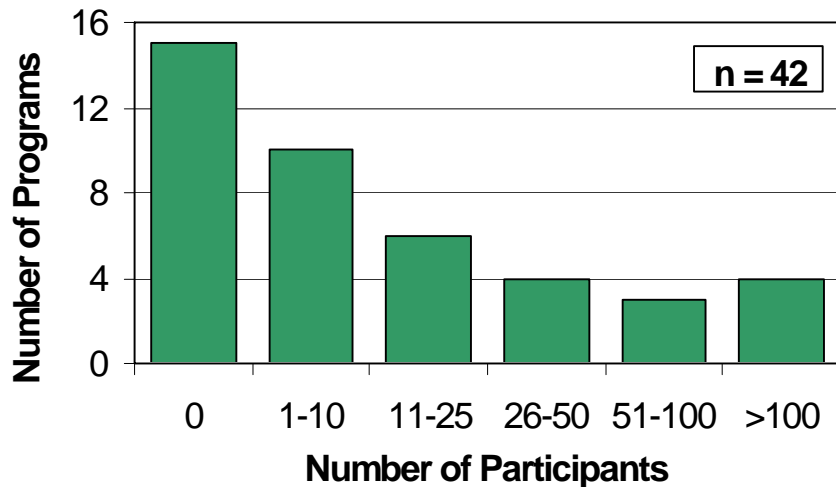
- Concern about customer satisfaction/retention driven by competitive pressures in the early- and mid-90s
  - Competition from other utilities (electric and gas), onsite generation, unregulated suppliers
  - Give large customers “early access” to the market
- Reducing peak demand rarely the sole motivation
  - Often an alternative to interruptible rates, allowing customers to “buy through”
- Load growth achieved by providing low prices in off-peak periods AND by allowing customers to add load without incurring additional demand charges

# RTP Program Outlook



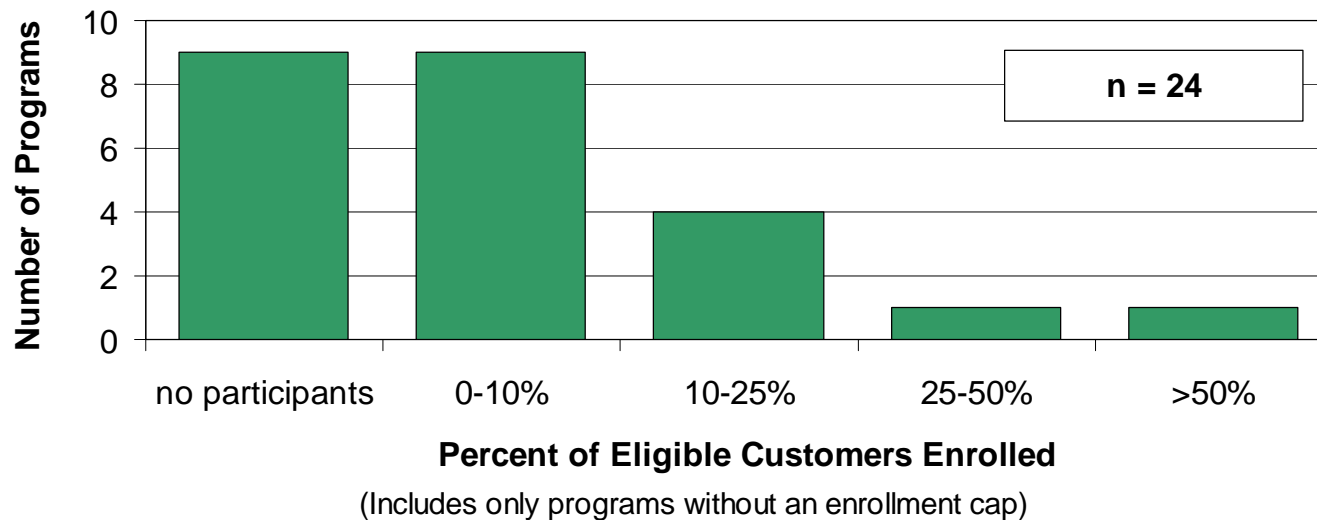
- ~34% of utilities report continuing active commitment to voluntary RTP
- Many programs “just coasting” or on their way out
  - Many programs never actively pursued
  - For others, outlook reflects lack of customer interest and/or changes in utility role associated with industry restructuring (e.g., divestiture)

# Voluntary RTP: Participation Levels



- 2,700 non-residential customers and 11,000 MW enrolled in 2003
- Although several programs have achieved a significant level of participation, most have not.
  - Three programs account for 80% of customers and 80% of load enrolled
  - One-third of programs had no participants, and another third had fewer than 25

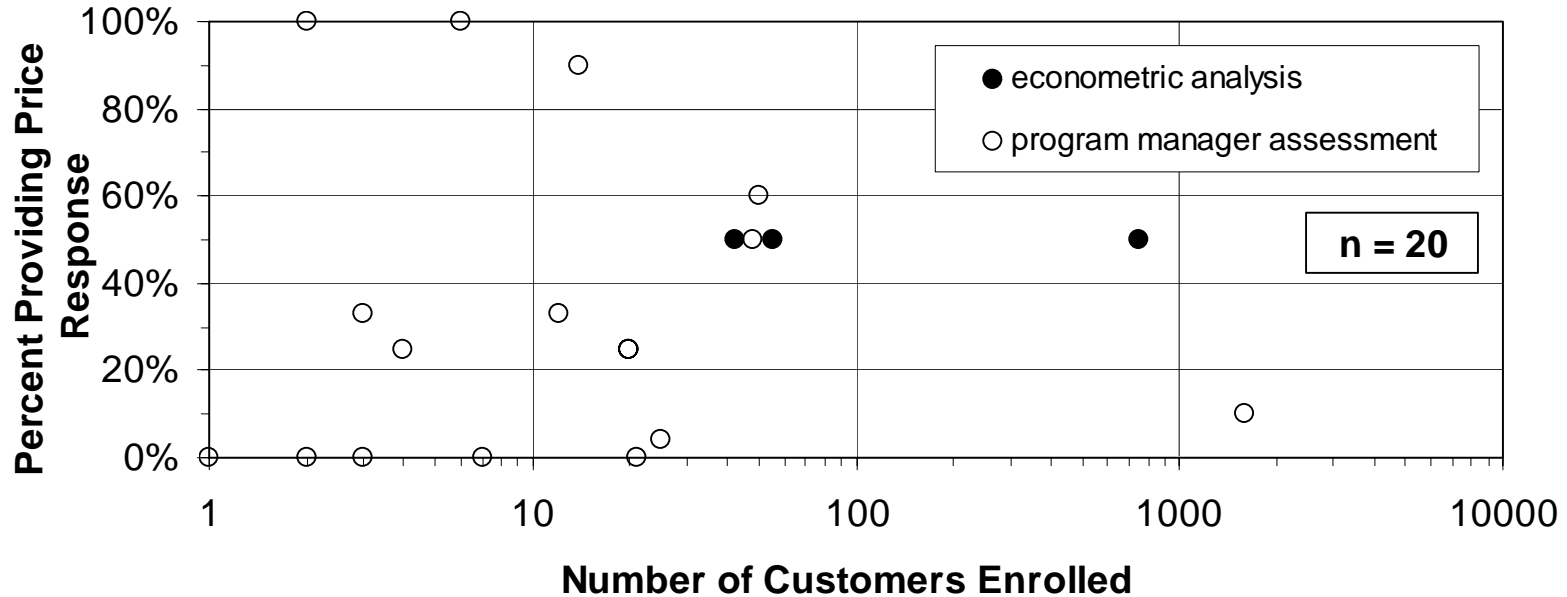
# Voluntary RTP: Market Penetration Rates



- Low market penetration for most programs: only two have >25% of eligible customers enrolled
- RTP tariffs typically restricted to non-residential customers larger than a specified size
  - 50% of programs restricted to customers > 500 kW
- Most programs not pro-actively marketed, or targeted to narrow sub-set of eligible customers (typically largest industrials)

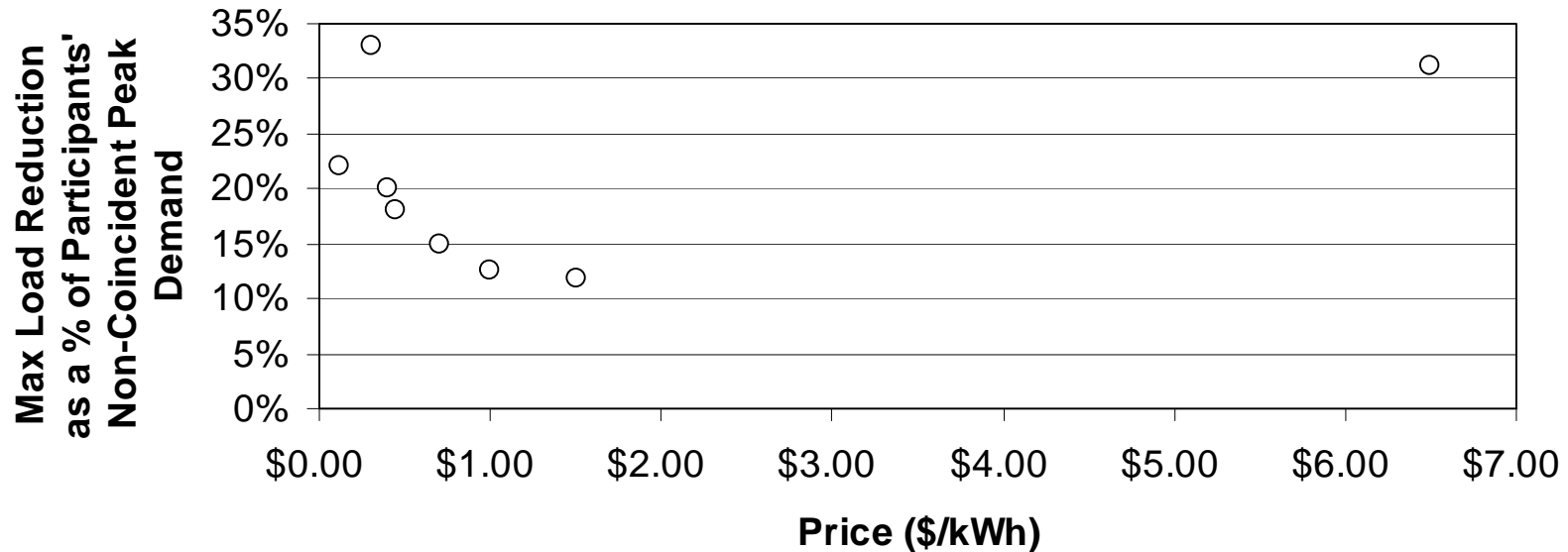


# Percentage of Participants that Respond to Prices



- Among programs with >10 participants, typically <60% of participants are price responsive
- Many customers enrolled expecting to save on their energy costs without responding on a daily basis
  - Arguably a consequence of marketing strategies and program goals

# Maximum Load Reductions



- Among programs with >20 participants, most have achieved maximum load reductions of 12-22% of participants' combined load
  - Higher prices did not necessarily correspond to larger percentage load reductions across RTP programs
- Aggregate load reductions are modest for nearly all RTP programs
  - Only two programs (Duke and Georgia Power) reported load reductions > 100 MW
  - All other programs with load reduction data had < 60 MW enrolled

# Prospects for Voluntary RTP as a Strategy for Developing Demand Response

- Two essential elements to success:
  - Customers must enroll
  - And must respond “significantly” in aggregate
- Several programs have successfully enrolled a sizeable number of customers, but most have not.
  - This could be indicative of customers’ calculated choices: too much risk for the potential benefit
  - But customer acceptance not yet thoroughly tested
- Existing programs have also demonstrated that, in aggregate, customers on RTP can drop their load by 20-30%
- Difficult to extrapolate from demonstrated levels of price response:
  - Small populations of quite large industrial customers
  - On-site generation a significant fraction of load response in most programs
  - Low-tech response strategies
  - Many customers enrolled without intending to monitor or respond to hourly prices

# Recommendations for Improving Design and Implementation of Voluntary RTP

- Sufficient resources must be devoted to developing and implementing a customer education program
- Customers need help understanding and managing price risk (e.g. risk management products, two-part CBL)
- Coordinate RTP implementation with other demand-side activities
- Include provisions for rigorous analysis of customer acceptance and price response

# Aligning Policy Objectives and RTP Program Design

- Utilities interests must be aligned with program goals
- Costs and benefits of obtaining incremental amounts of price responsive load from RTP must be weighed against those of other types of DR programs.
- Account for the potential environmental and market impacts of the increased use of on-site generation resulting from RTP