

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

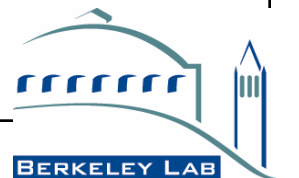
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Environment**

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Outline of Talk

- Case Study of NMPC RTP Default Service Tariff
- Review of 43 Utility RTP Programs: Optional Tariff
- Key Policy/program design issues:
 - Policy/programmatic objectives for RTP
 - Are customers satisfied with RTP as default service? Did they switch and are they hedged?
 - If RTP is offered as an optional tariff service, how many customers choose to enroll?
 - Does RTP deliver demand response?
 - How do RTP and DR programs interact?

Optional vs. Default Service RTP: Overview of Key Design Issues

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

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):** up-front reservation payment
 - **Day-Ahead Demand Response Program**

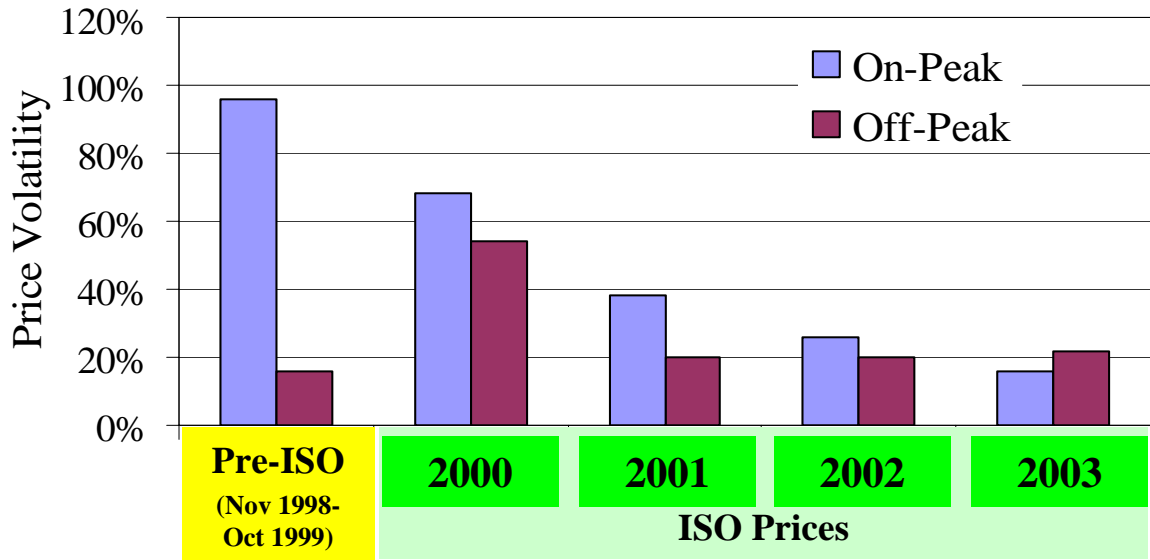
Survey Respondent and Population Characterization

Customer Characteristics		Survey Respondents (53 customers; 60 accounts)	All SC-3A Customers (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%

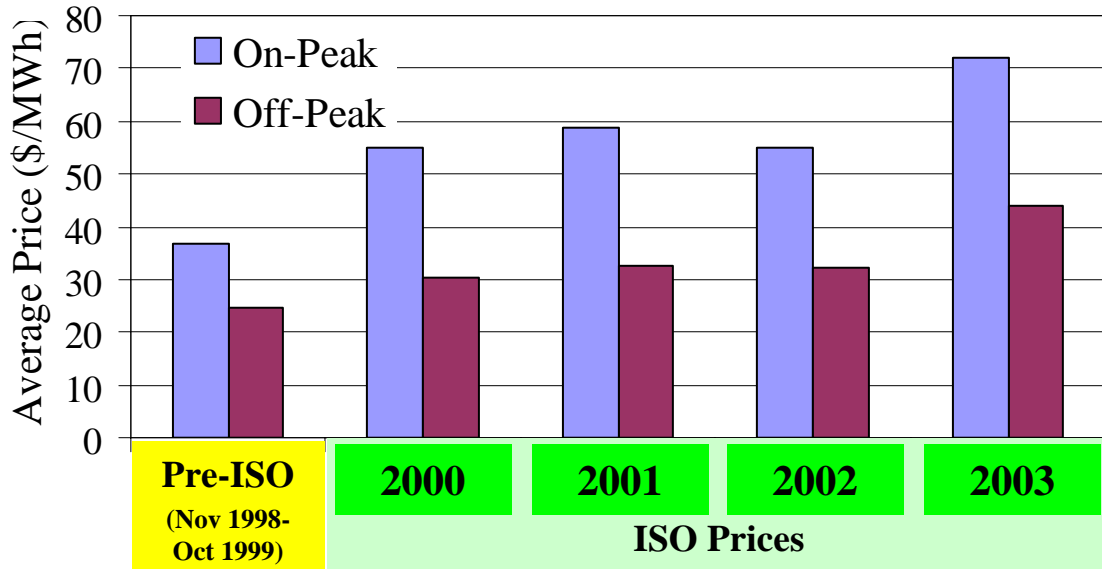
The survey response rate was about 40%.

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

Day-Ahead Market Prices: Declining Volatility, Increasing Average Prices

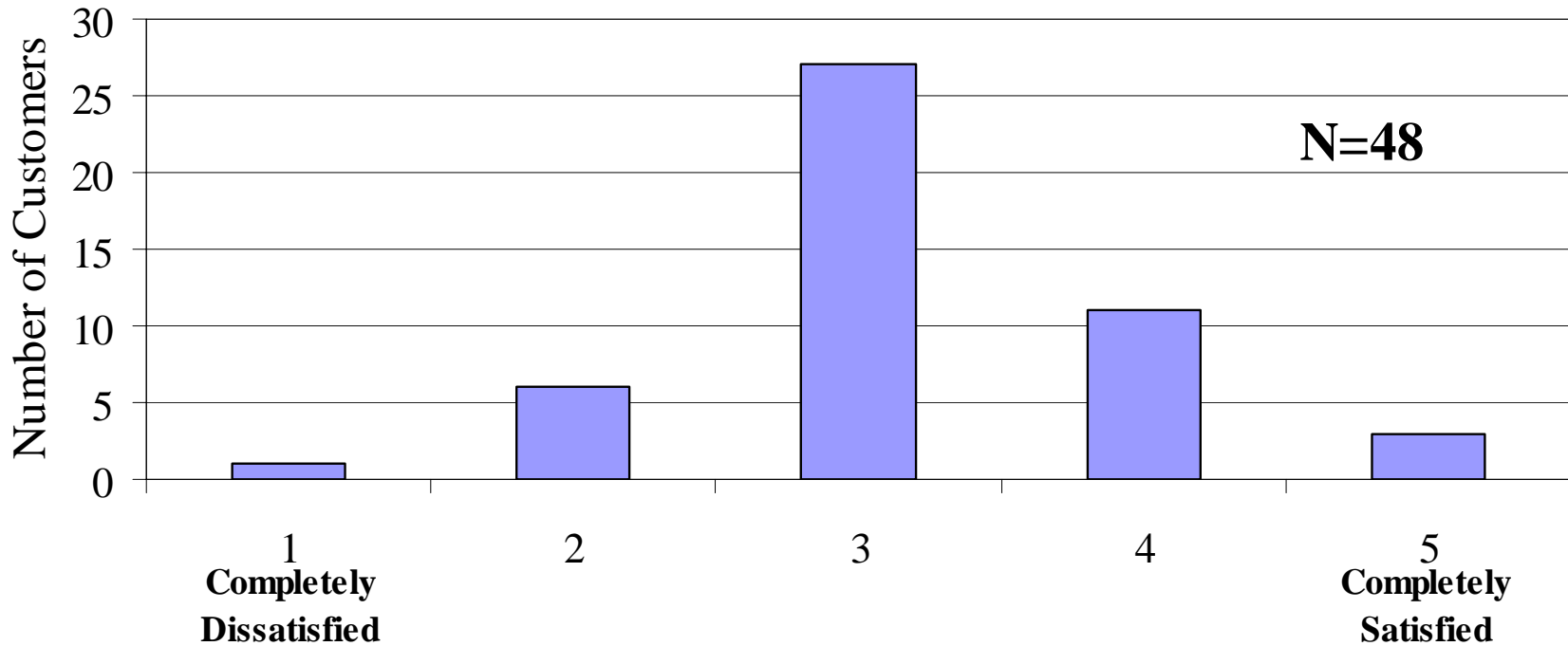


- Similar trends in all NMPC load zones



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

Customer Satisfaction with NMPC RTP Tariff

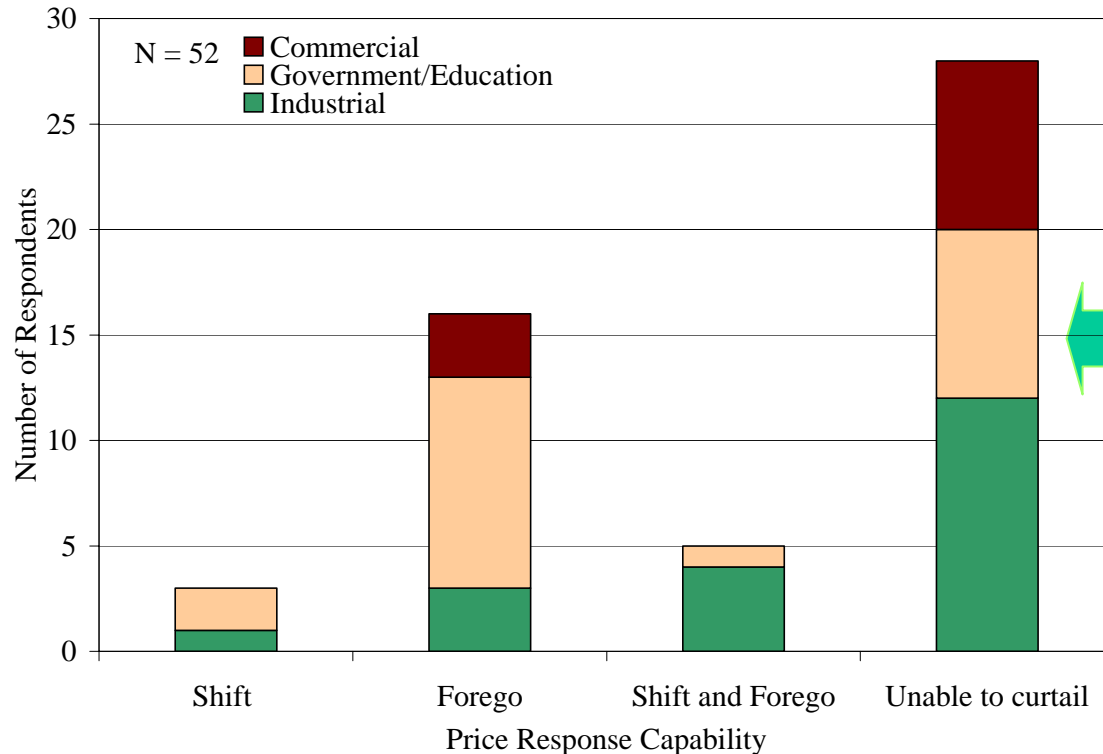


Customer Satisfaction with 1998 Redesign of SC-3A

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

Does RTP Deliver DR?

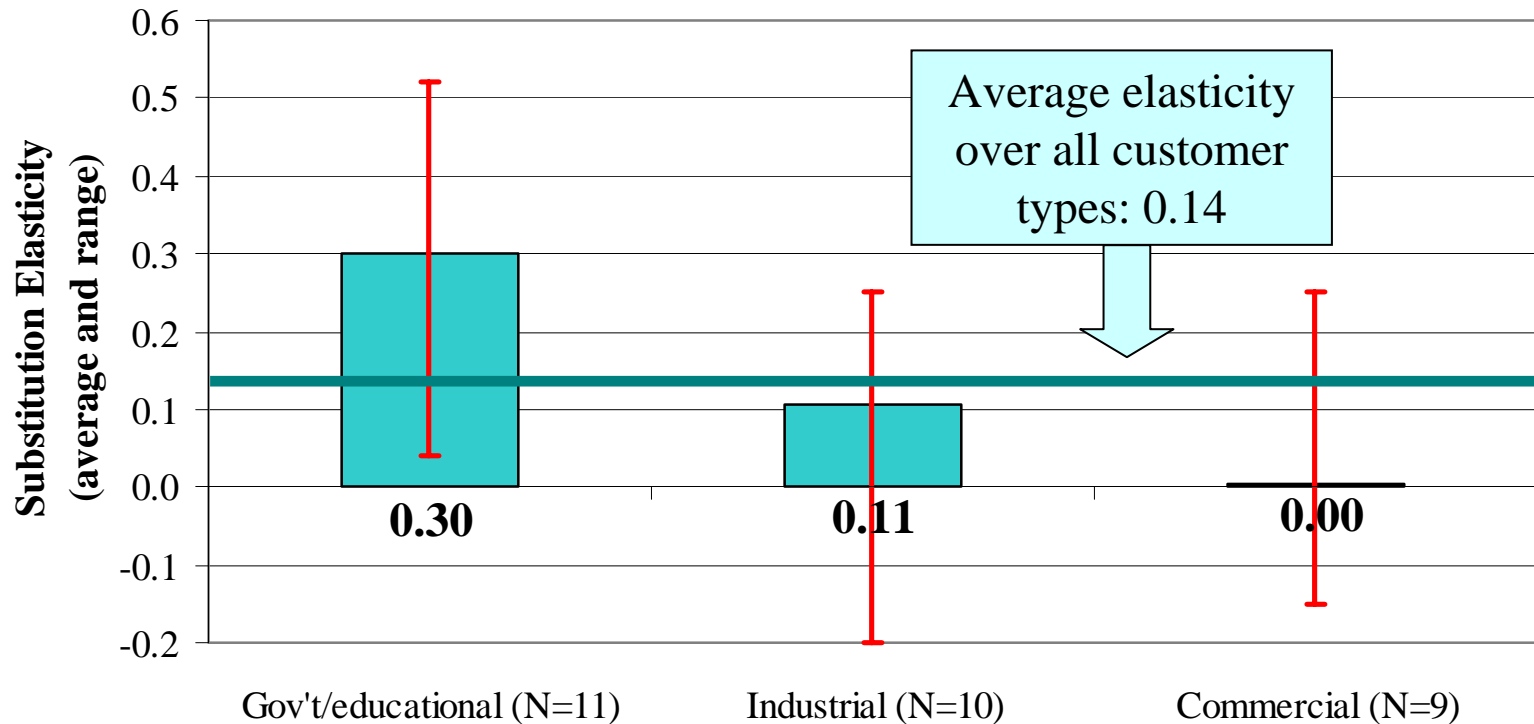
Self-reported Price Response Capability: What Customers Told Us?



**But 30%
enrolled in
NYISO DR
program**

- 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
- Customers may make a distinction:
 - RTP is price response
 - ISO programs are a call to keep the lights on (civic duty)

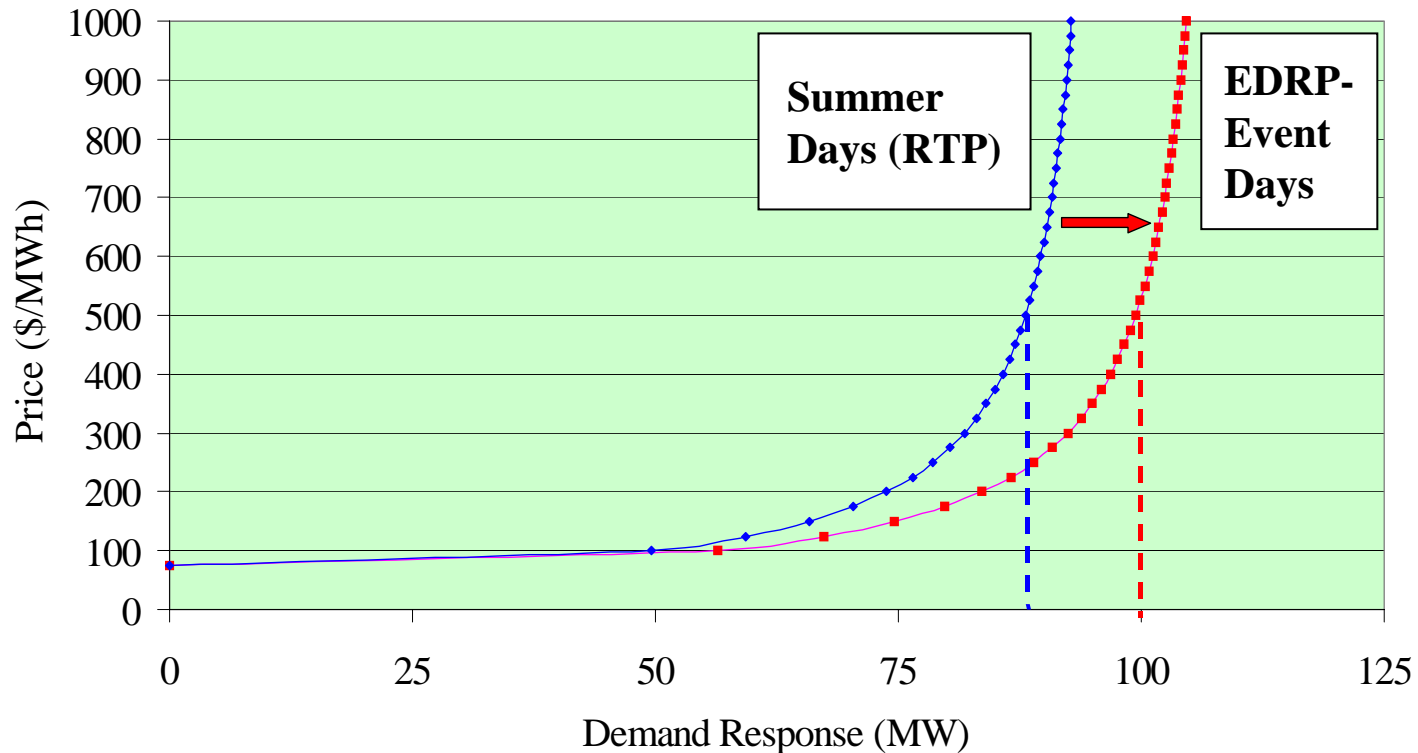
Price Response: Estimated Substitution Elasticities



- 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?

Estimated Aggregate Demand Response: RTP and EDRP



- DR potential is ~100MW at high prices; ~18% of SC-3A customers' total maximum demand
- ~37% of customers enrolled in NYISO Emergency DR programs; provide additional ~15MW of load curtailment (mainly industrials)

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 (0.14) comparable to other studies' results
 - Aggregate DR potential is ~100MW at high prices
- ISO DR programs complement RTP
 - Industrial customer response to DR programs is greater than for RTP

Policy & Program Design Implications

- 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

Policy and Program Design Implications

- 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
- It will take time to develop RTP price response
 - Initial response for most customers is discretionary (not shifting), which limits:
 - Number of customers willing to participate
 - Amount of peak demand that participants will curtail

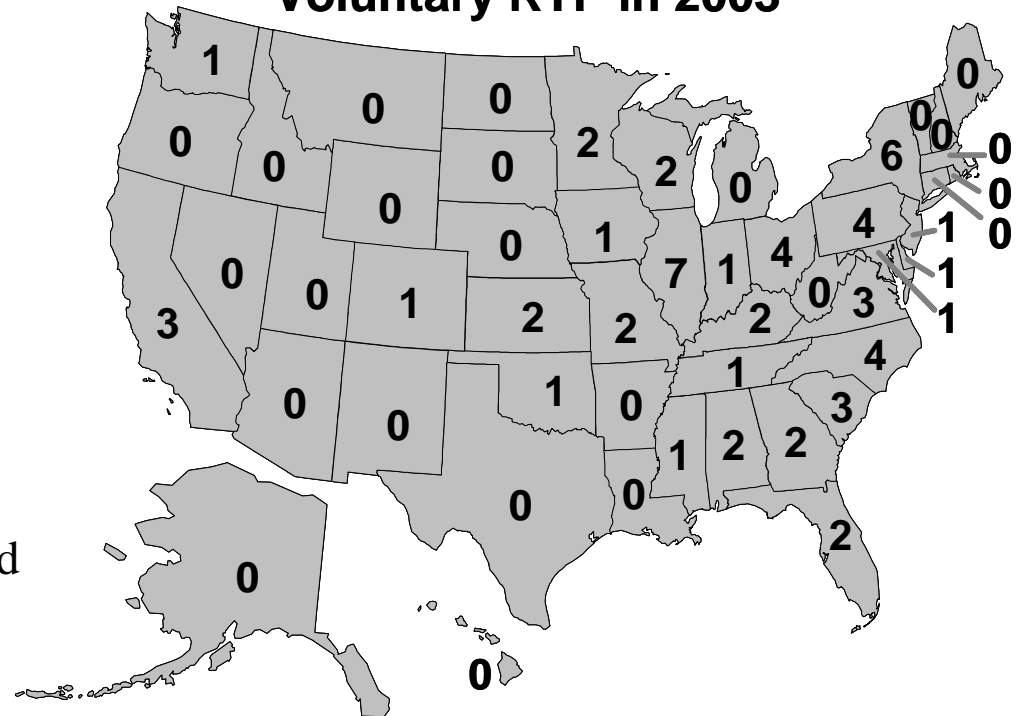
Survey of Utility Experience with RTP Programs: Optional Tariffs

- Summarized 43 RTP programs offered in 2003
 - Offered as Optional tariff; excludes default service rates
 - Investor-owned and large publicly-owned utilities
- Interviewed utility program managers and reviewed publicly available sources
- Analysis of Key Trends:
 - Utilities' motivations for offering RTP as optional tariff
 - Tariff design features
 - Program participation
 - Participant price response
 - Program status and outlook

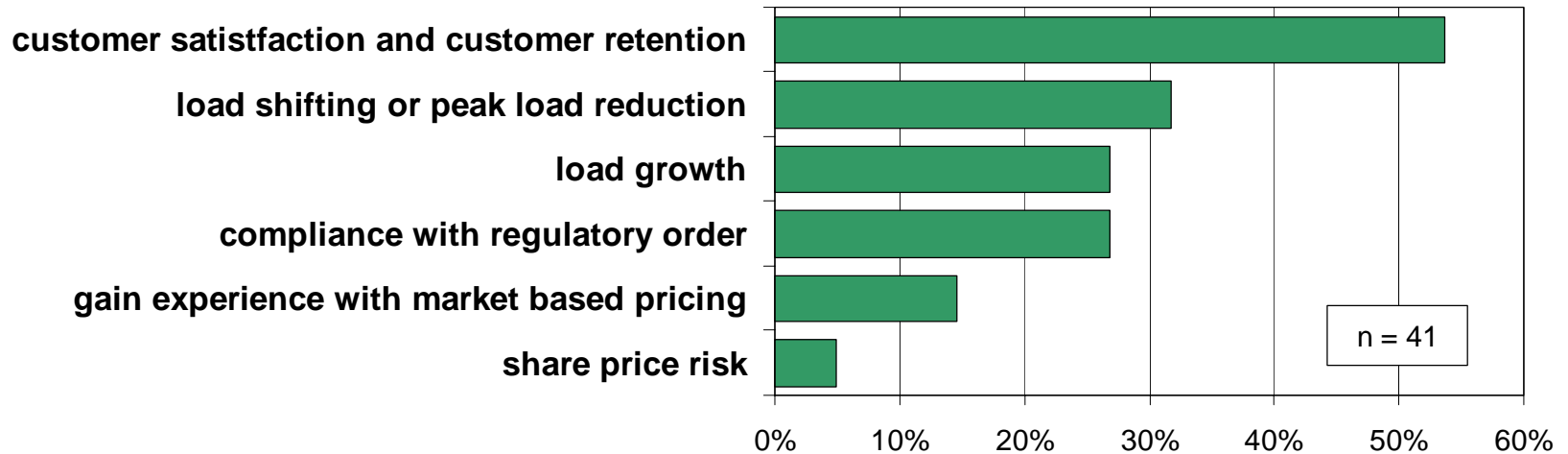
Geography of RTP as Optional Tariff

- 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
- RTP not offered by many utilities in:
 - The West
 - New England

Number of Utilities in Each State with Voluntary RTP in 2003



Utility Motivations for RTP

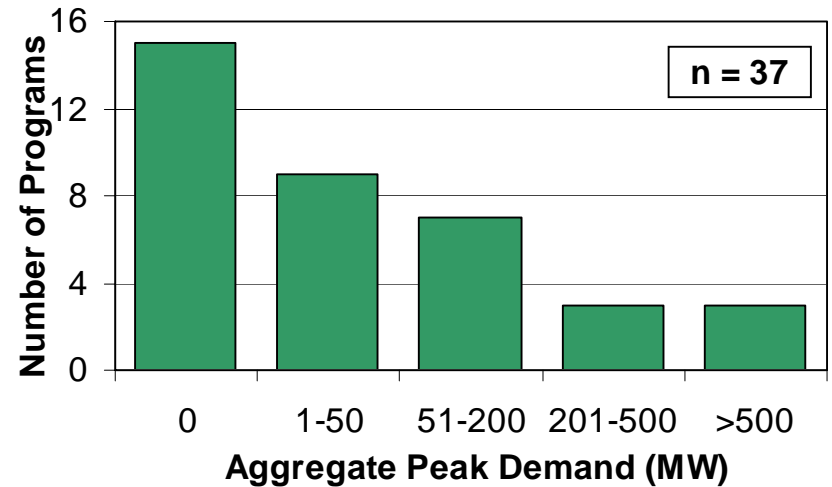
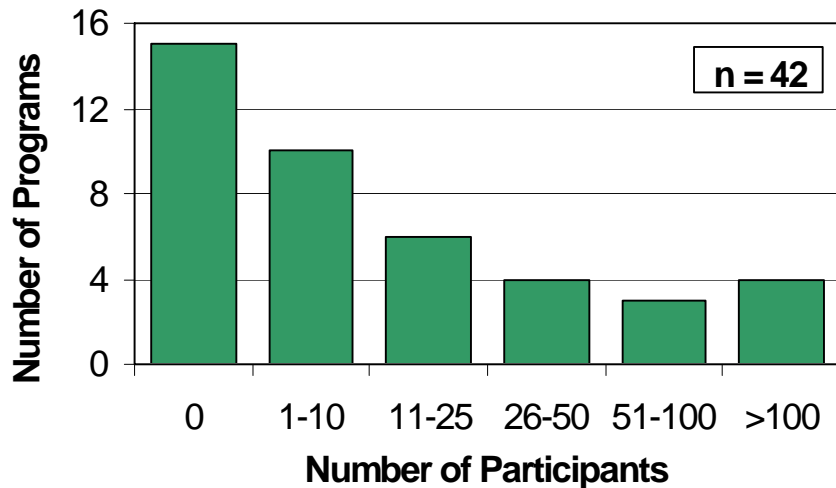


* Some utility program managers identified multiple motivations; thus, percentage values for all categories add to more than 100%

Percentage of RTP Programs*

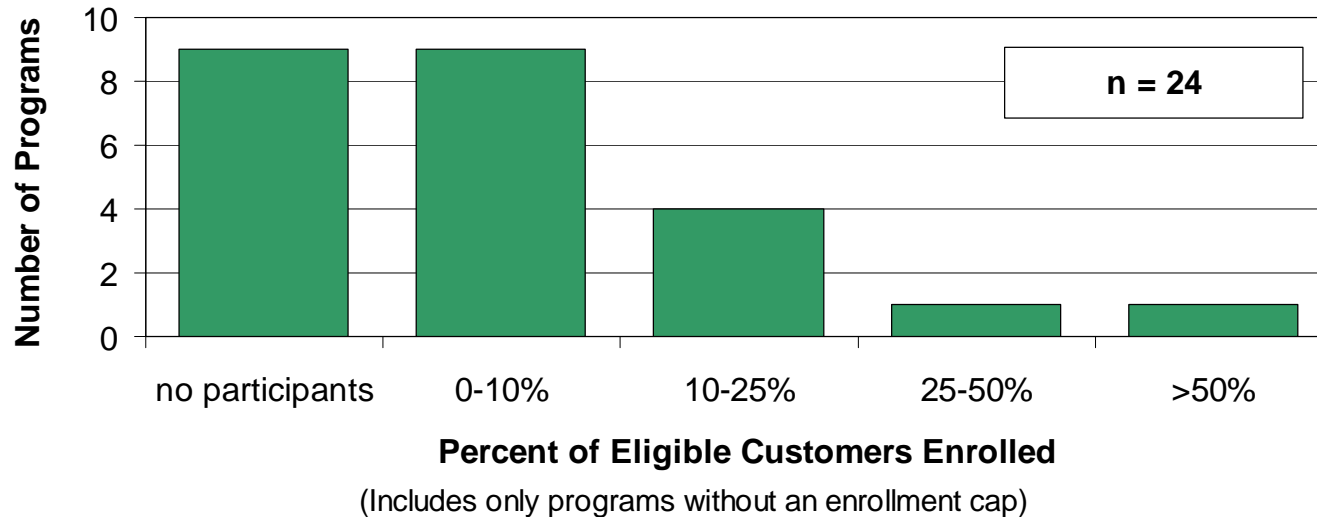
- Concern about customer satisfaction/retention driven by competitive pressures
 - From other electric/gas utilities, onsite generation, unregulated suppliers
- Reducing peak demand rarely the sole motivation
 - Often an alternative to interruptible rates
- Load growth achieved by providing low prices in off-peak periods AND by allowing customers to add load without incurring additional demand charges

RTP: Participation Levels



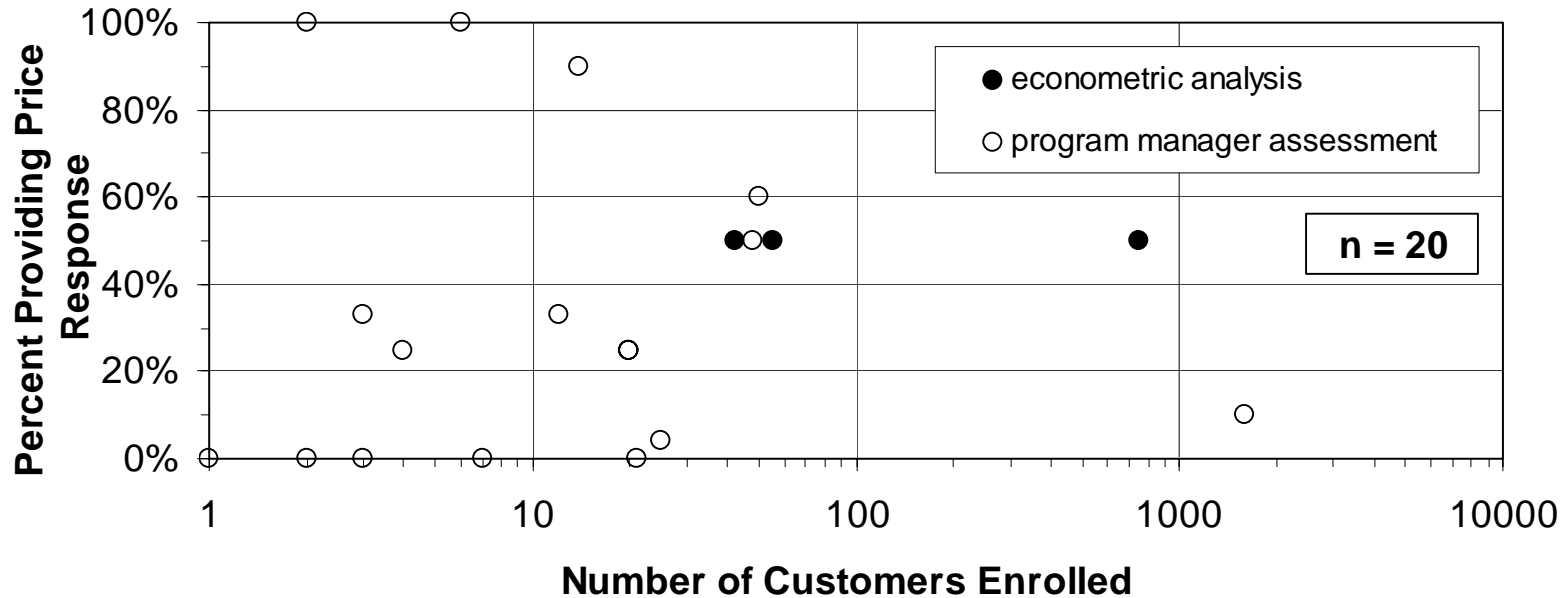
- 2,700 non-residential customers and 11,000 MW enrolled in 2003
- Although several programs have achieved a significant level of participation, most have not.
 - Three programs account for 80% of customers and 80% of load enrolled
 - One-third of programs had no participants, and another third had fewer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

RTP: Market Penetration Rates



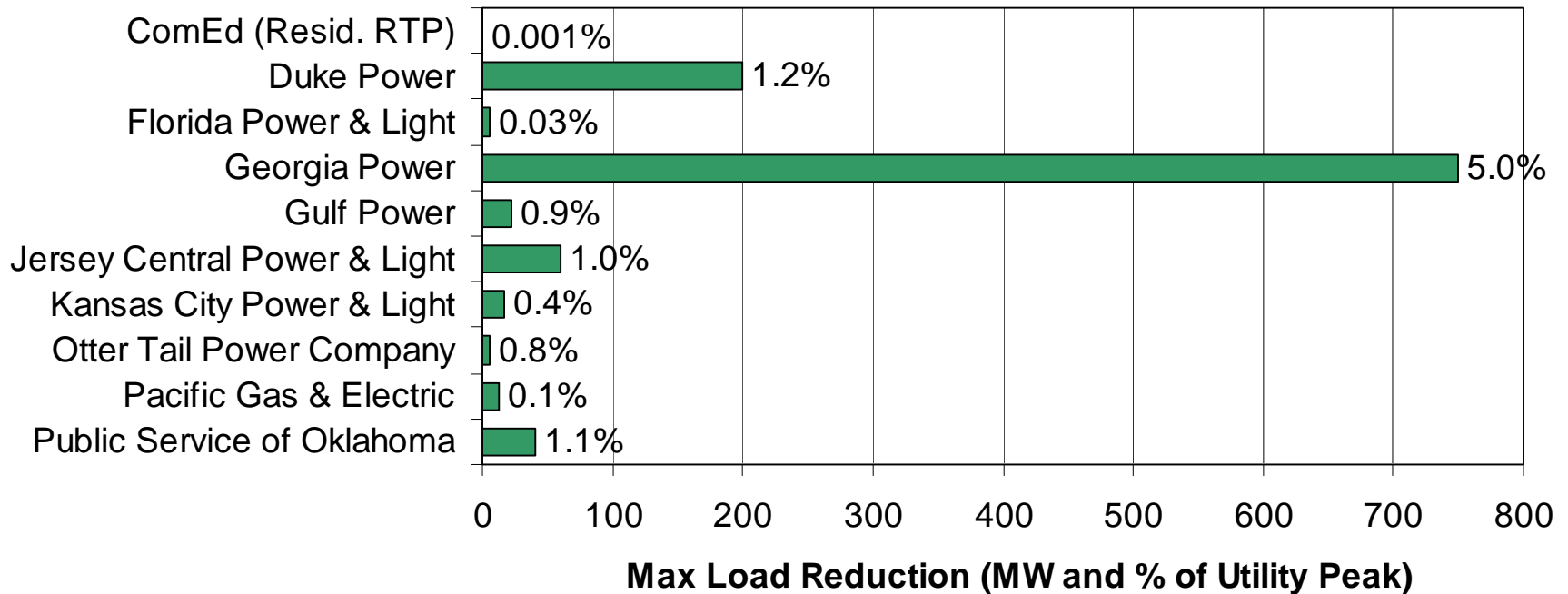
- Low market penetration for most programs: only two have >25% of eligible customers enrolled
- RTP tariffs typically restricted to non-residential customers larger than a specified size
 - 50% of programs restricted to customers > 500 kW
- Most programs not pro-actively marketed, or targeted to narrow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

Percentage of Participants that Respond to RTP Prices



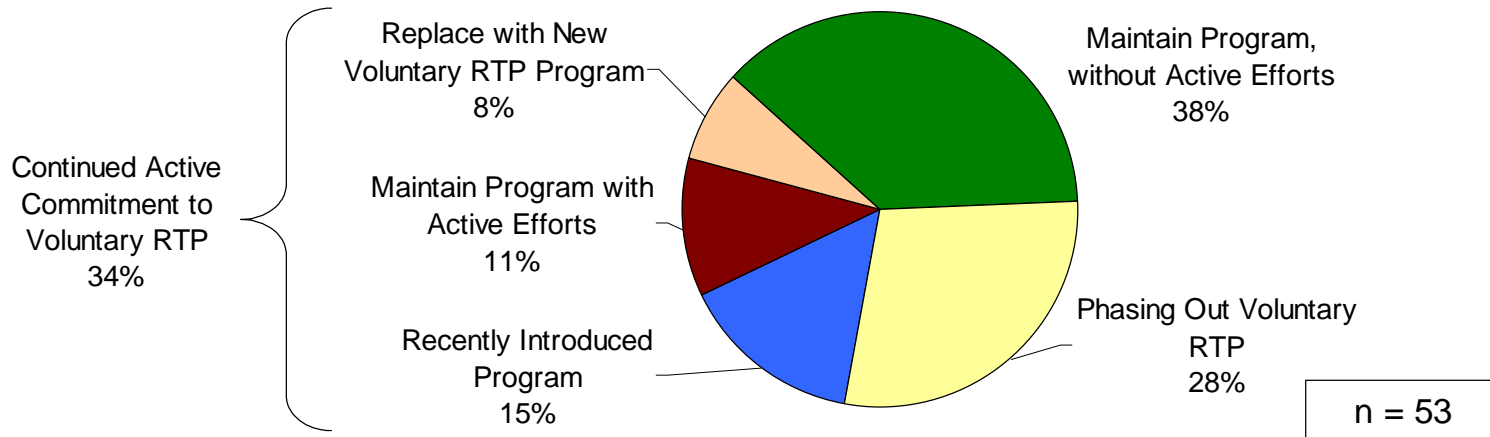
- Among programs with >10 participants, typically <60% of participants are price responsive
- Many customers enrolled expecting to save on their energy costs without responding on a daily basis
 - Arguably a consequence of marketing strategies and program goals

Maximum Load Reduction From RTP



- Aggregate load reductions are modest for nearly all RTP programs
 - Only two programs (Duke and Georgia Power) reported load reductions greater than 100 MW
 - All other programs with load reduction data had < 60 MW enrolled
- Among programs with >20 participants, most have achieved maximum load reductions of 12-22% of participants' combined load

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)

Prospects for RTP Optional Tariff as Demand Response Strategy

- 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
- In aggregate, customers on RTP tariffs have reduced their peak demand by 12-22% in response to high prices (with a high of 33%)
- Difficult to extrapolate DR potential from existing RTP programs:
 - 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 who didn’t intend to monitor or respond to hourly prices

Improving Design and Implementation of RTP as Optional Tariff

- 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
- Conduct program evaluation: need rigorous analysis of customer acceptance and price response
- Assess costs and benefits of obtaining incremental amounts of price responsive load from RTP vs. other DR programs
- Account for the potential environmental and market impacts of the increased use of on-site generation resulting from RTP
- Consider RTP and CPP tariffs as default service

LBL Publications on RTP

<http://eetd.lbl.gov/EA/EMP/emp-pubs.html>

- (1) *A Survey of Utility Experience with Real Time Pricing* LBNL-54238, December 2004
- (2) *Does Real-Time Pricing Deliver Demand Response? Case Study of Niagara Mohawk's Large Customer RTP Tariff*, LBNL-54974, August 2004.
- (3) *Real Time Pricing and the Real Live Firm*, LBNL-54978, August 2004.