



Utility Experience with Real-Time Pricing

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Presentation Overview



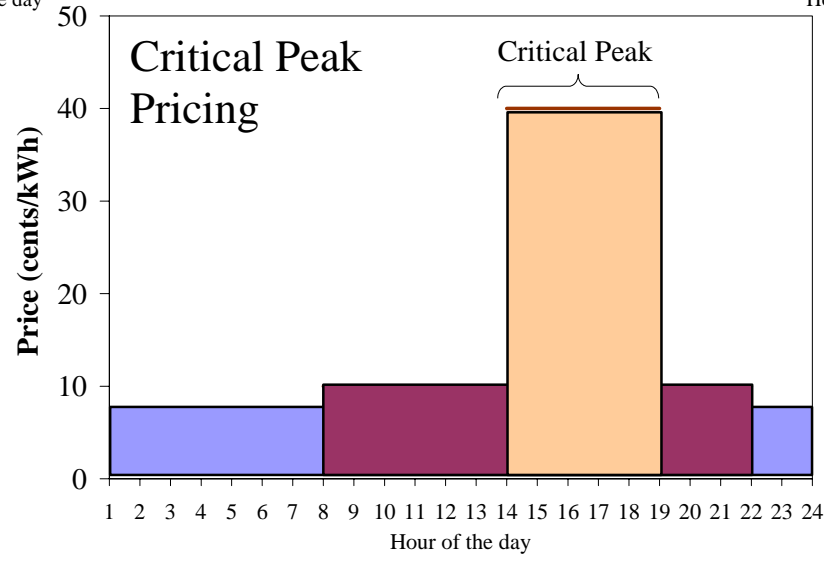
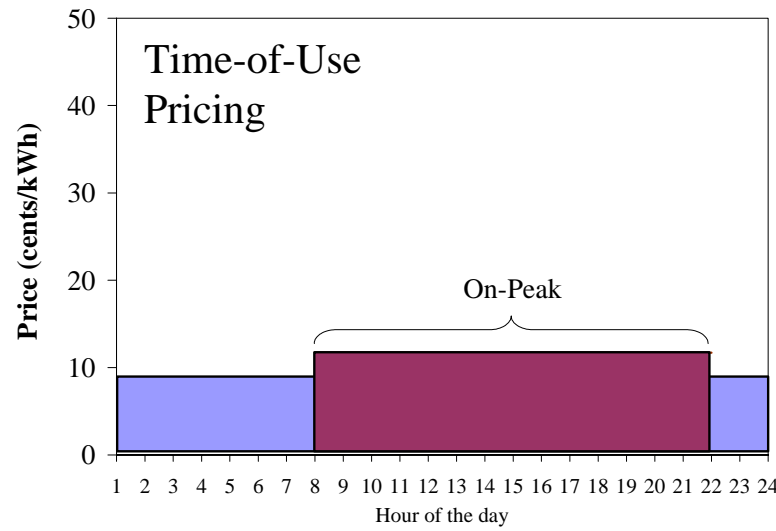
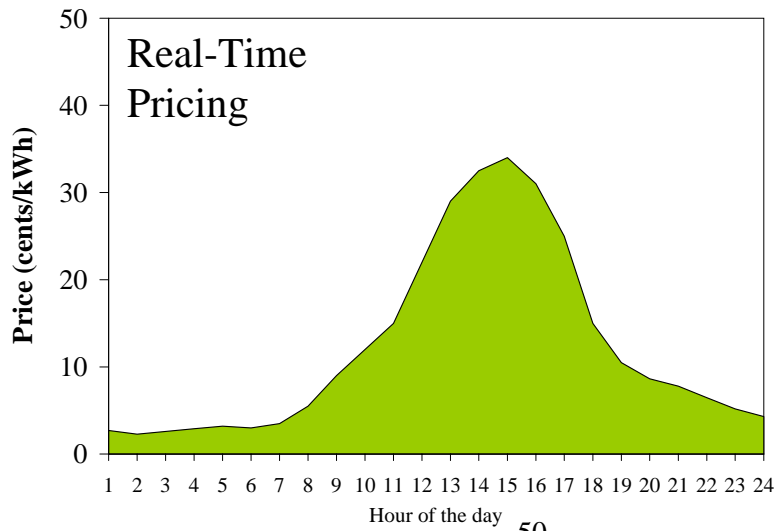
- Concepts and Terminology
- Utility Experience with RTP
 - Customer Enrollment
 - Market Penetration
 - Customer Response
- Key Findings and Policy Implications

Definitions and Terminology

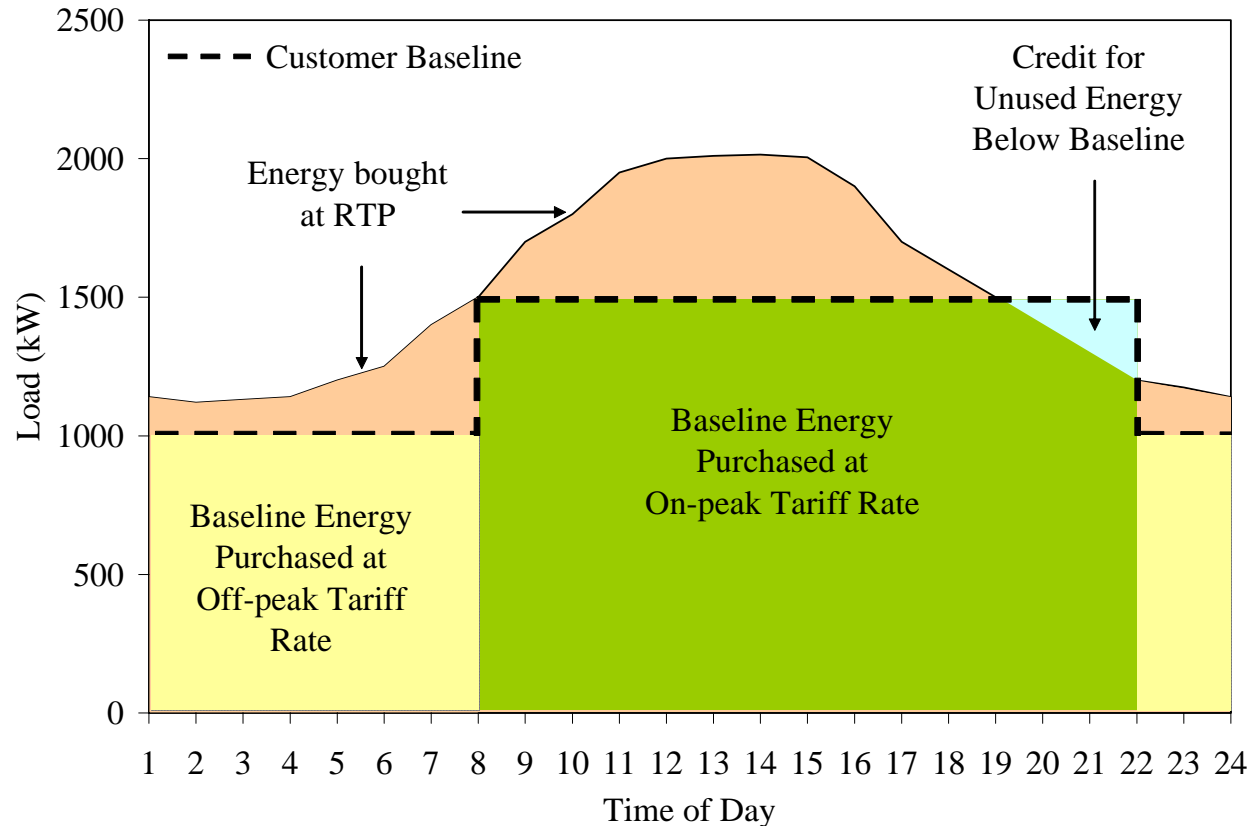


- **Time-based Pricing**
 - Real-time pricing
 - Critical peak pricing
 - Time-of-use rates
- **Optional vs. default service**
 - Optional = opt-in
 - Default = opt-out
- **Customer Load Response Strategies**
 - Load shifting
 - Load curtailment (forego discretionary load)
 - On-site generation
- **“Smart Metering”**

RTP, TOU, and CPP Tariffs

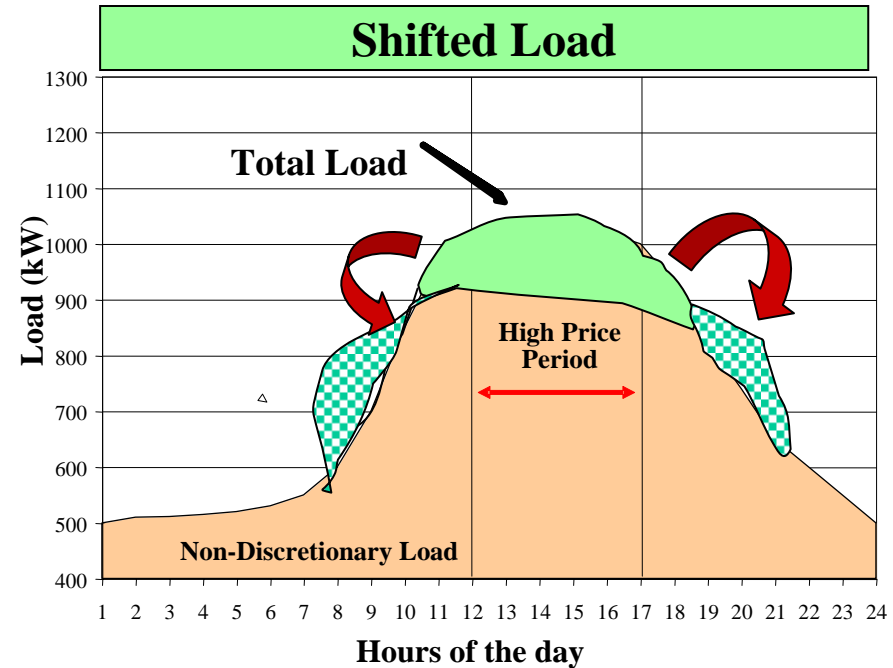
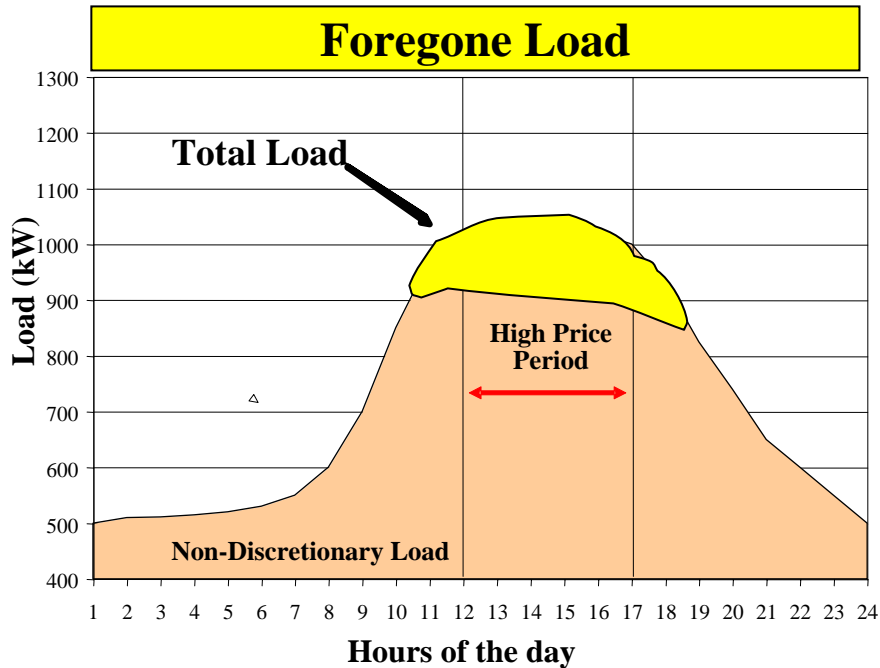


Two-part RTP Tariff: How It Works



- Customer sees hourly prices for their marginal usage
- Customer baseline (historic) usage (CBL) partially hedges customer against hourly price volatility

Customer Response Strategies: Forego Usage vs. Load Shift



Customers' assess their DR potential: discretionary vs. non-discretionary usage

- Some customers shift load from the peak, and make it up off-peak
- Some customer's maximum load curtailment is often limited to discretionary loads; unwilling to curtail more even if prices rise

Advanced Metering Infrastructure



- **Automated Reading System (AMR) systems**
 - *Add a data recording and communications device (“meter module”) to a conventional kWh meter that allows meter to be read from a utility vehicle that drives by customer site.*
 - *AMR systems usually limited to single cumulative kWh reading (& typically don’t support dynamic pricing)*
- **Advanced Metering Infrastructure (AMI):**
 - **the capability to measure, record and store energy usage at intervals of one hour or less**
 - **a communication link that allows the utility to remotely retrieve current usage information to support customer billing and other utility operational functions**

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



	Optional Service	Default Service
Objectives	Customer retention, load growth	Encourage retail market development; minimize risk for default service provider
Tariff Design	Two-part with Customer Baseline (CBL)	RTP for commodity with unbundled T&D charges
Marketing	Targeted to largest customers, often through account reps	N/A
Customer Education	Occasionally offered by utilities (e.g., workshops 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 third parties or competitive retailers
Tech. Assistance & DR Technologies	Occasionally offered by utilities	

Utility Experience with RTP: Overview



- **RTP as an Optional Service:**

- Offered by **>70 utilities in the U.S. over the past two decades**

- As of 2003, ~40 utilities offered an optional RTP program

- **Diverse utility motivations**

- Customer retention, load management, regulatory compliance

- **Several large programs, but most have had few participants**

- **RTP as a Default Service for “Large” C&I**

- **Currently implemented by 11 utilities in 4 states (and planned or proposed for 15 additional utilities)**

- **Primary policy driver is to support the transition to a competitive retail market and to encourage market development**

Utility Experience with RTP Programs: Optional Tariffs



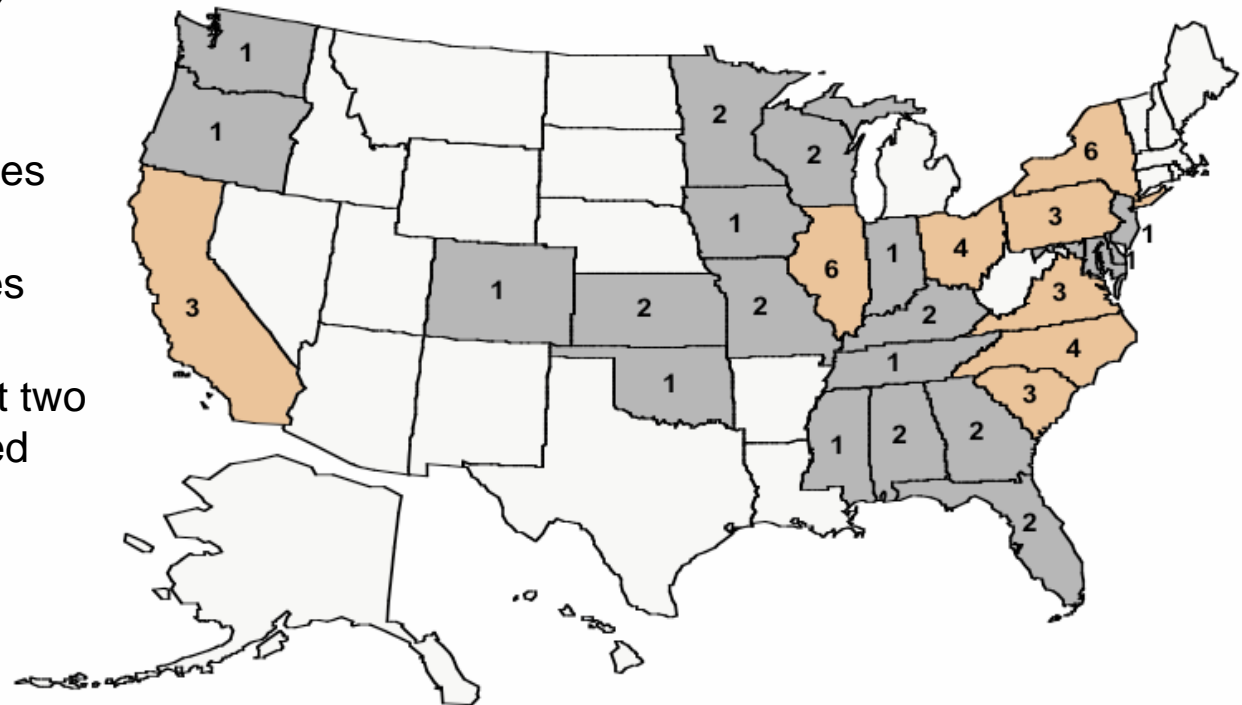
- **Summarized 43 RTP programs**
- **Interviewed utility program managers and reviewed publicly available sources**
 - Analyzed trends in program participation & participant price response
- **Key Policy Questions**
 - Can RTP provide significant demand response capability and sustained performance, if offered as an optional service tariff?
 - What factors contribute to successful optional service RTP programs?

Optional RTP Tariffs: Current Status

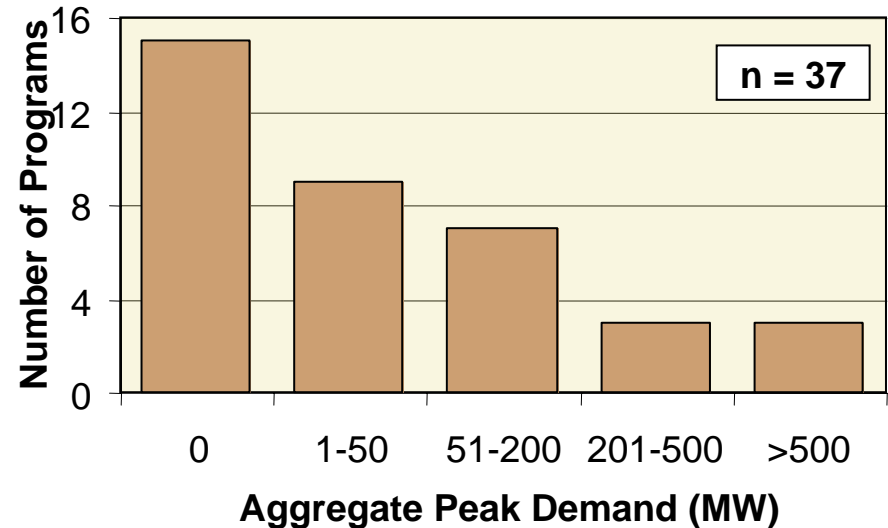
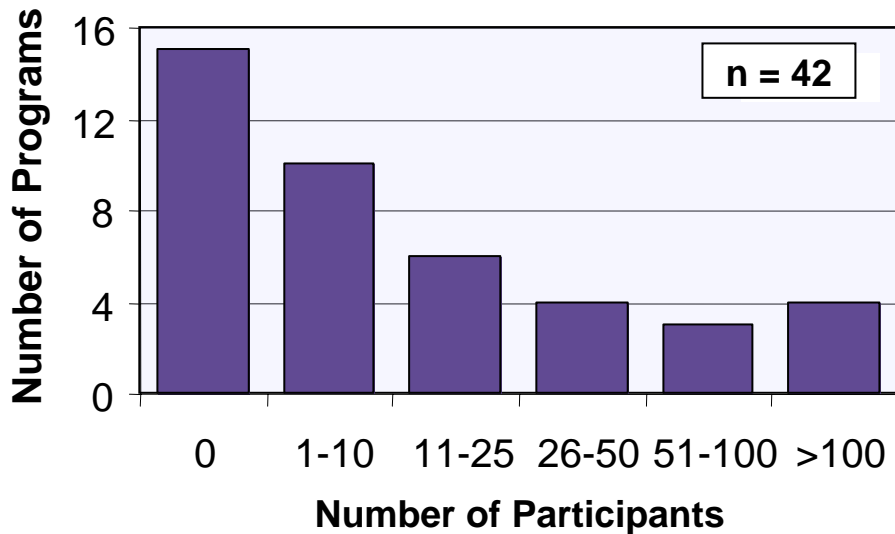


- **RTP offered by:**
 - Most investor-owned utilities (IOU) in Southeast and TVA
 - All IOU in Illinois and NY (statutory/ regulatory requirement)
 - FirstEnergy-owned utilities in OH (4) and PA (3)
 - Other Midwestern utilities (Cinergy, Xcel, KCPL)
 - All CA IOUs in 2003, but two programs since cancelled
- **RTP not offered by many utilities in:**
 - The West
 - New England

Number of Utilities in Each State with RTP as Optional Tariff (2003)

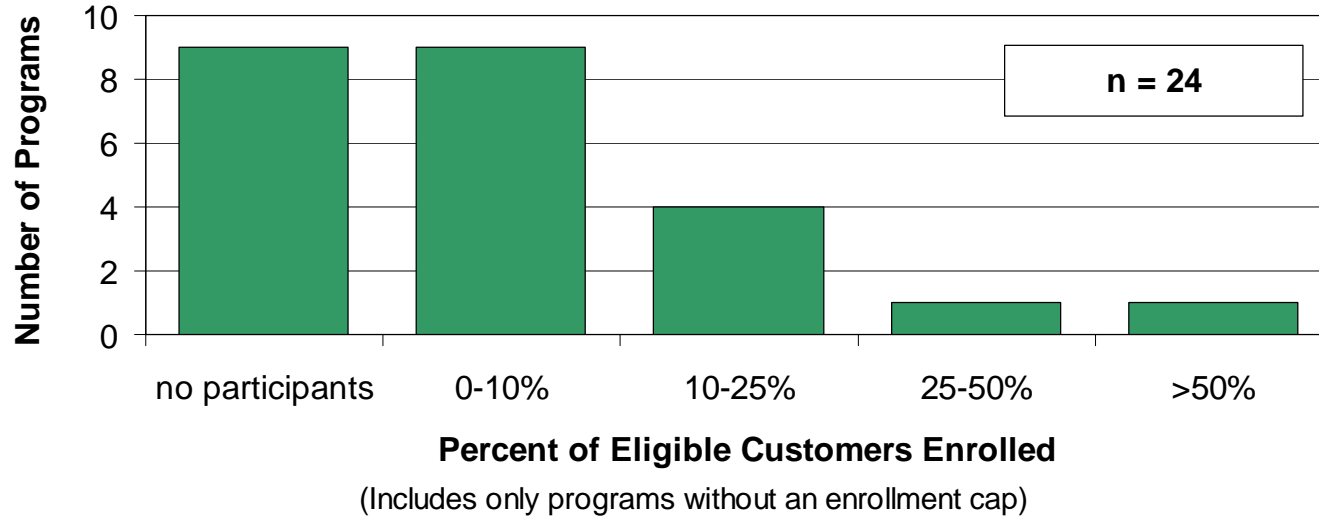


Optional RTP Tariff Enrollment



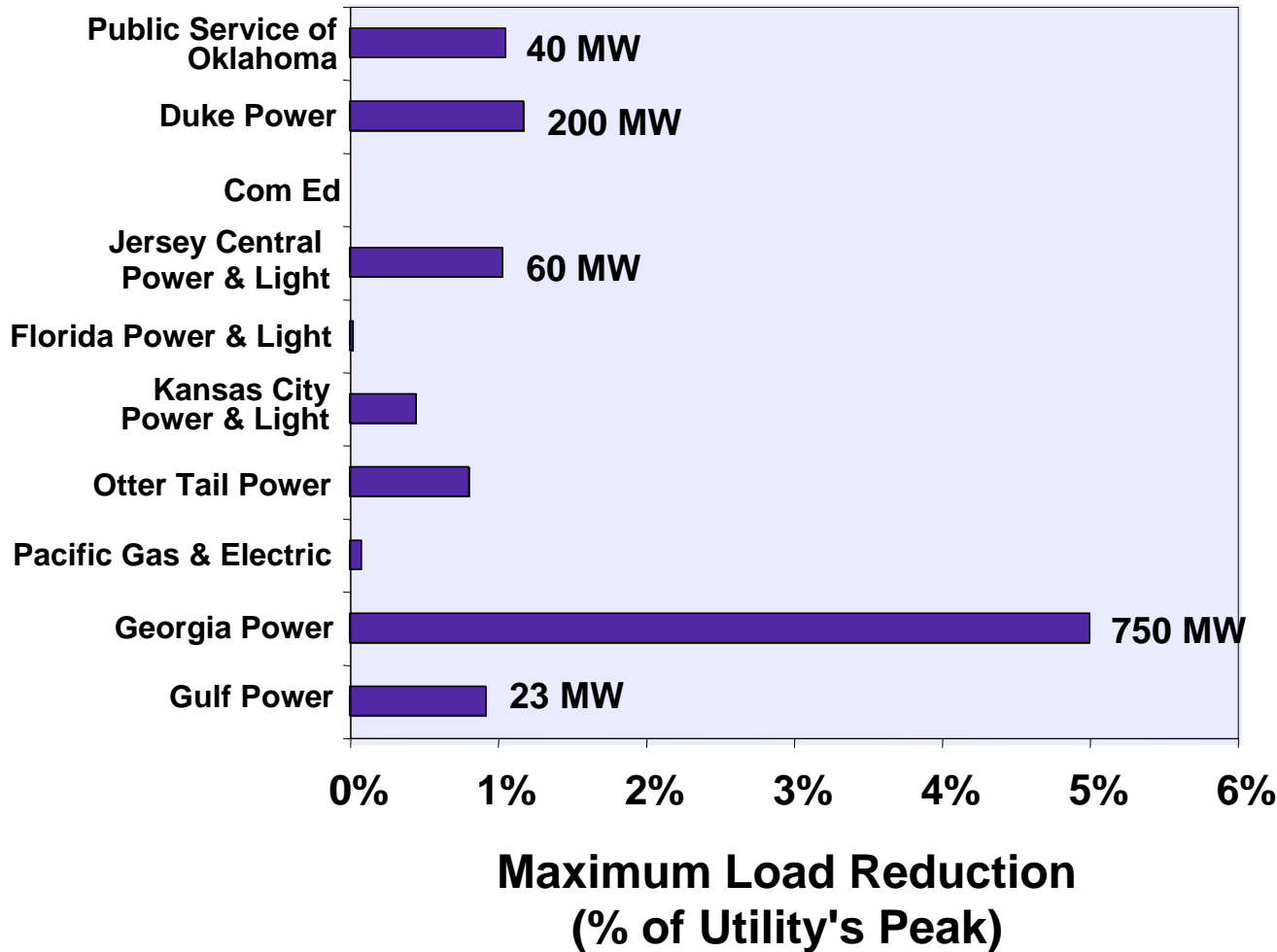
- **2,700 C/I customers and 11,000 MW enrolled in 2003**
- **Level of participation varies substantially:**
 - Three programs account for 80% of customers and load enrolled (GA Power, TVA, Duke Power)
 - One-third of programs had no participants, and another third had fewer than 25
- **Modest participation levels due to enrollment caps, limited marketing, and customer attrition**

Optional RTP: Market Penetration Rates



- **Low market penetration for most programs: only two have >25% of eligible customers enrolled (TVA and Gulf Power)**
- **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)**

Customer Response to High Prices in RTP Programs



- Aggregate load reductions are ~1% of utility peak for almost all RTP programs, except Georgia Power

Why Georgia Power's RTP program is successful?



- **Unique Georgia retail market underlies Georgia Power's success with RTP**
 - “New” C&I customers have a one-time choice of supplier and GPC is allowed to compete
 - High-level corporate commitment to RTP as **a tool to compete for new load**
- **Key tariff design and implementation details**
 - Aggressive **marketing** for >10 yrs
 - High degree of **ongoing customer support** and training
 - Attractive **hedging options**
 - Two-part tariff design with CBL
 - Supplemental financial hedging products (caps, collars, contracts for differences, adjustable CBLs)
 - **CBL rules** have enabled many participants to obtain substantial bill savings, regardless of load response

Georgia Power RTP: *CBL Rules Enable Bill Savings*

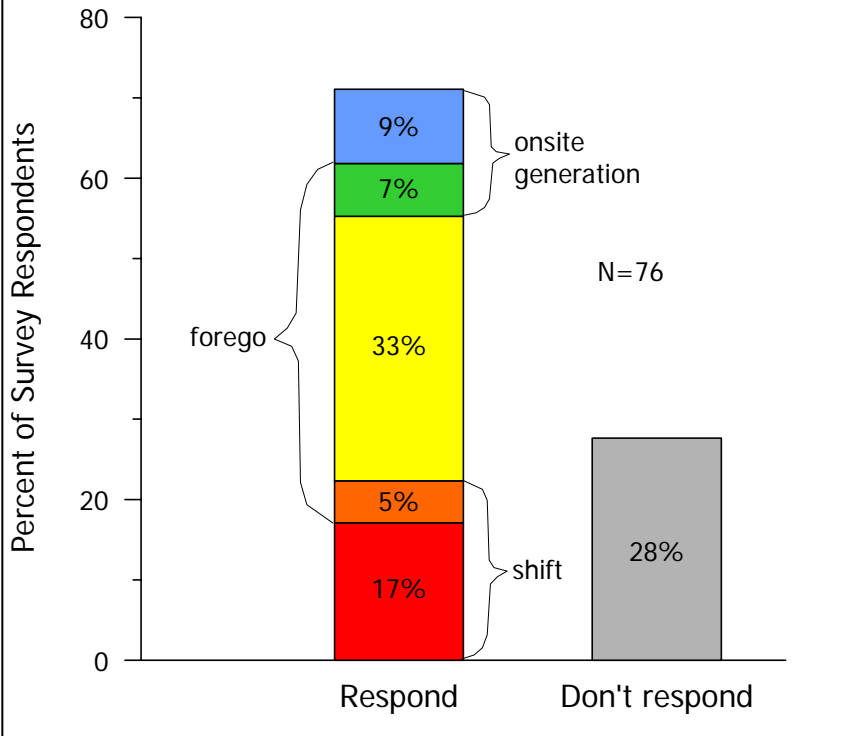


- On average, each customer on Georgia Power's RTP rate has a CBL equal to 60% of its actual load
- Hourly RTP prices for load above the CBL have historically averaged less than standard tariff rates
 - Marginal vs. Embedded Costs
- How can this be?
 1. **Customers previously on Georgia Power's Supplemental Energy rate** (a curtailable rate) could receive an initial CBL equal to their Firm Load Level
 2. **New customers** can receive a CBL below their projected load
 3. **All customers** can expand their facilities or add load without adjusting their CBL upward

Barriers to Price Response: Niagara Mohawk RTP Case Study



Load Response Strategies



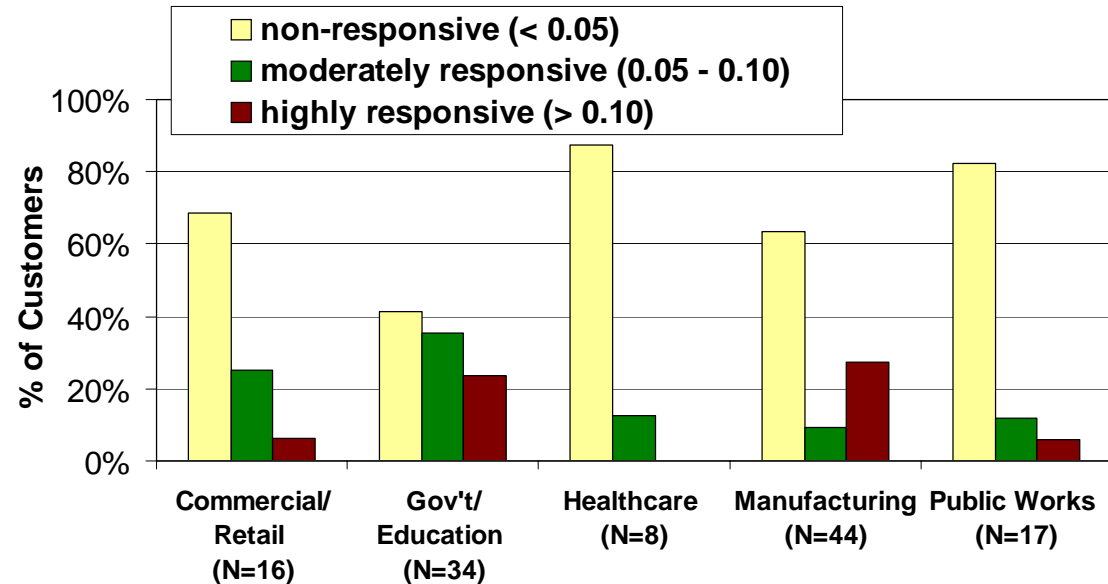
Barriers to Price Response (N=76)	Frequency
No barriers encountered	9
Organization/ Business Practices	
Insufficient time to pay attention to prices	39
Institutional barriers	23
Inflexible labor schedule	16
Inadequate incentives	
Electricity is not a priority	17
Cost/inconvenience outweighs savings	17
Risk averse/ hedged	
Management views price response as too risky	10
Flat rate or time-of-use contract makes responding unimportant	9

- ~30% of NMPC customers say they are unable to curtail load
- ~70% can either forego or shift load or utilize onsite generation
- Most customers report multiple barriers to price response; ~15% respond without obstacles

Niagara Mohawk RTP: What customers actually did?



Business Category	N	Average Elasticity
Manufacturing	44	0.16
Gov./Education	34	0.10
Commercial/Retail	16	0.06
Healthcare	8	0.04
Public Works	17	0.02
Total	119	0.11



- Relative price responsiveness varies substantially across and within business sectors
- Key Findings:
 - 18% of customers account for 75-80% of aggregate DR
 - 119 customers reduced their peak demand (500 MW) by ~10% (50 MW)

RTP as a Demand Response Strategy: Key Findings



- “You can build it but they may not come”
 - Low enrollment in most optional RTP programs
- “Participation doesn’t guarantee price response”
 - Only 10 of 42 Optional RTP programs report load reductions
 - 18% of Niagara Mohawk customers account for 75-80% of DR
- “RTP can deliver DR but it takes sustained commitment, time and high prices”
 - In aggregate, NMPC and Georgia Power RTP customers reduced coincident peak demand by 10% and 15% at high prices
- Program design, supporting infrastructure and utility incentives are keys to success
 - Default Service RTP: Day-ahead, hourly pricing balances retail market development and DR
 - Optional RTP: Georgia Power’s secrets to success (corporate commitment, aggressive marketing; customers can hedge; and CBL rules allow customers to generate bill savings)
 - Policymakers must make long-term commitment to build DR infrastructure (e.g., customer info, tech. assistance, codes/standards, mkt. assessment)

LBLN Reports on RTP Experience



“A Survey of Utility Experience with Real Time Pricing”

G. Barbose, C. Goldman and B. Neenan. LBNL-54238, December 2004.

“Real Time Pricing as Default or Optional Service for C&I Customers: A Comparative Analysis of Eight Case Studies”

G. Barbose, C. Goldman, R. Bharvirkar, N. Hopper, M. Ting and B. Neenan. LBNL-57661, August 2005.

“Customer Strategies for Responding to Day-Ahead Market Hourly Electricity Pricing”

C. Goldman, N. Hopper R. Bharvirkar, B. Neenan, R. Boisvert, P. Cappers, D. Pratt, and K. Butkins. LBNL-57128. August 2005.

Reports available at:
[pubs.html](http://eetd.lbl.gov/ea/EMS/drlm-pubs.html)

<http://eetd.lbl.gov/ea/EMS/drlm->

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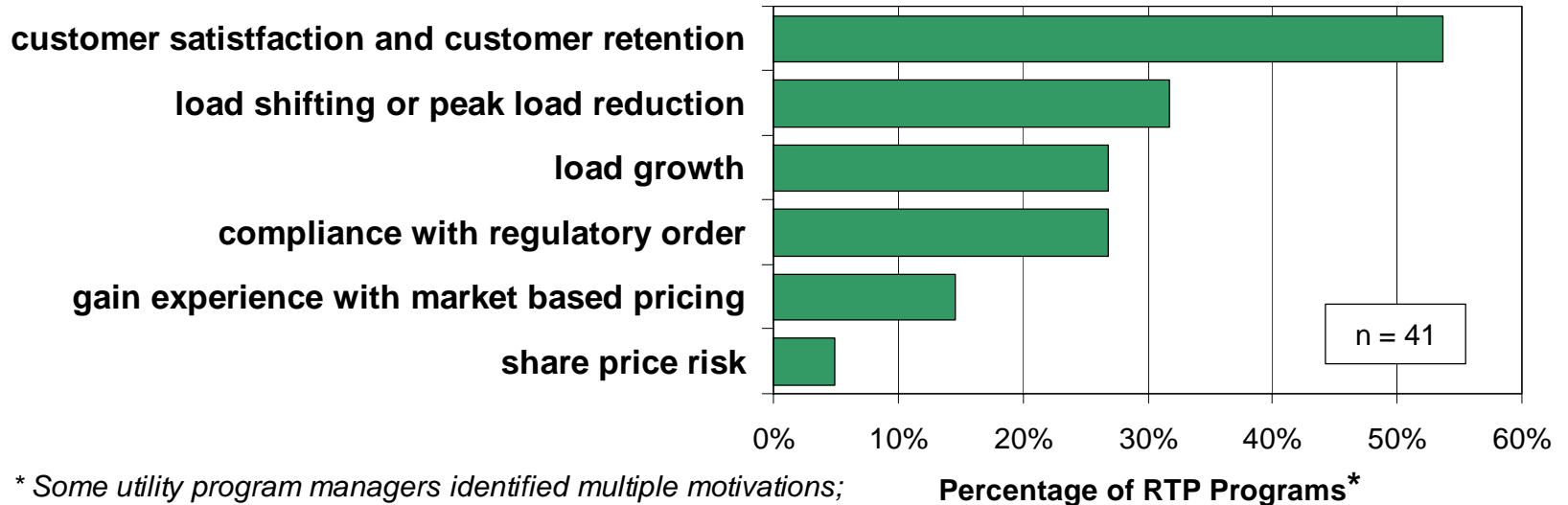
LBNL Electricity Markets and Policy Group
Publications

<http://eetd.lbl.gov/EA/EMP/>

Background slides



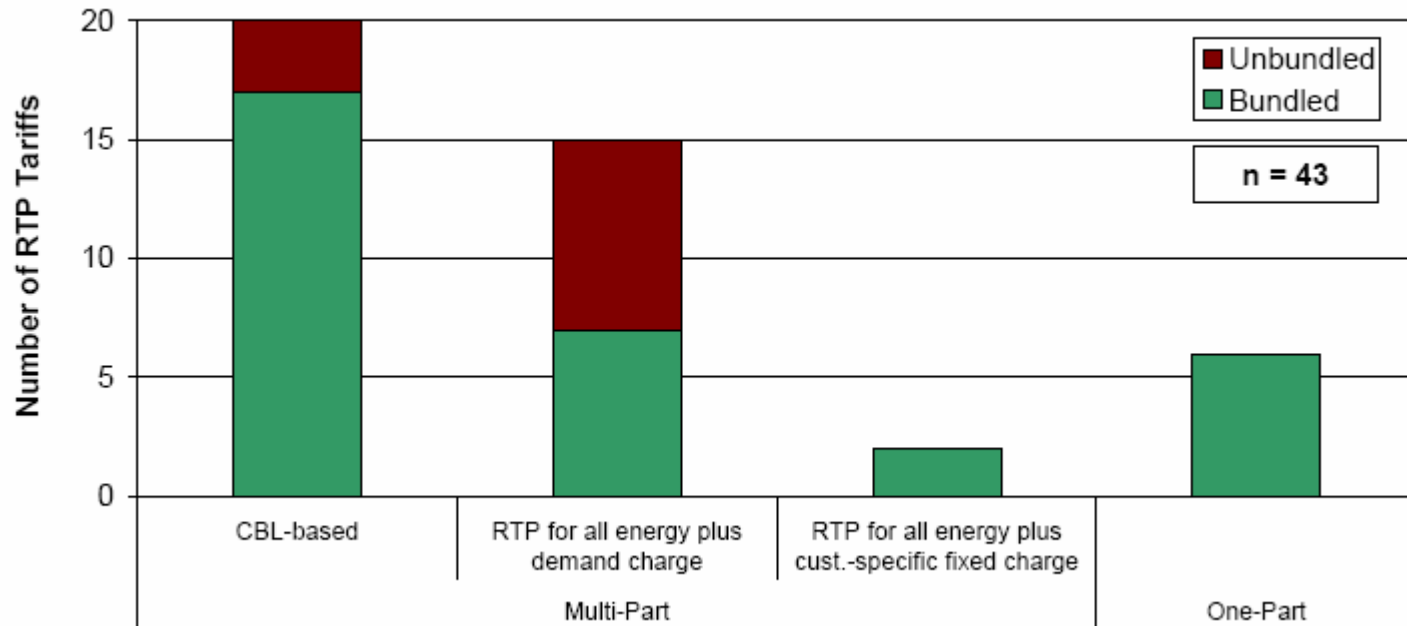
Utility Motivations for Optional RTP



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

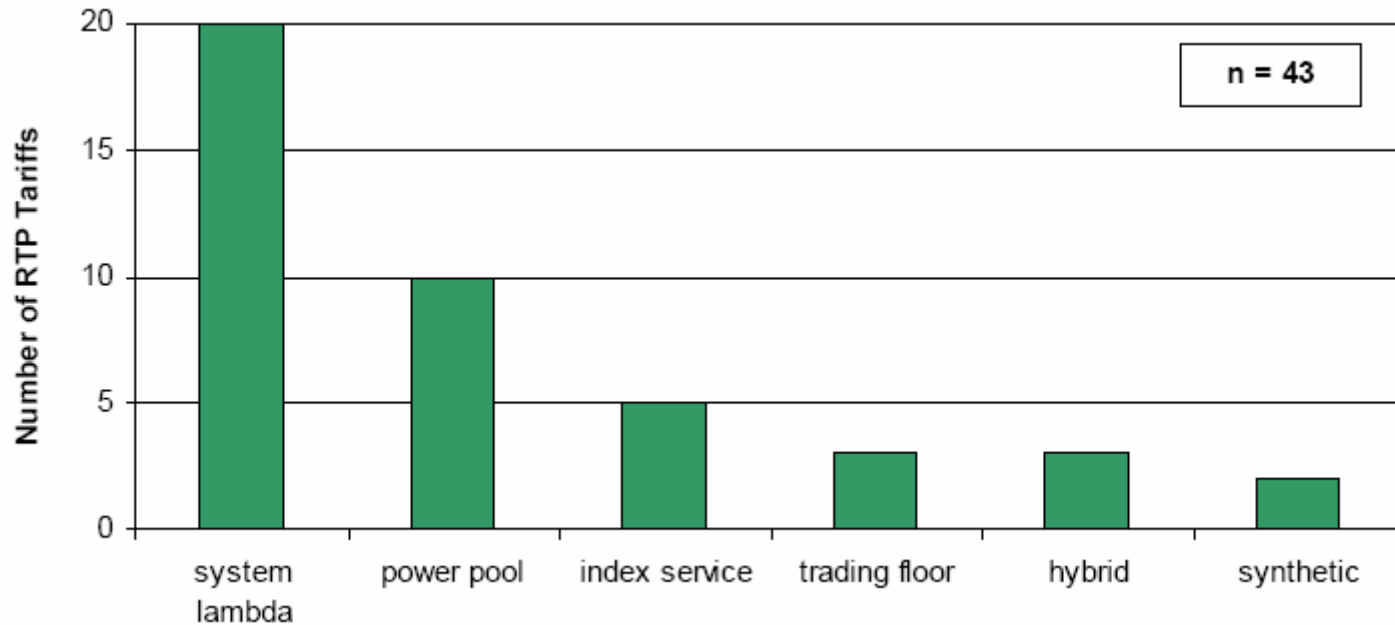
- **Reducing peak demand rarely the sole motivation**
 - Often an alternative to interruptible rates, allowing customers to “buy through”
- Concern about customer satisfaction/retention driven by competitive pressures in the early- and mid-90s
- Load growth achieved by providing low prices in off-peak periods AND by allowing customers to add load without incurring additional demand charges

Design of Optional RTP Tariffs



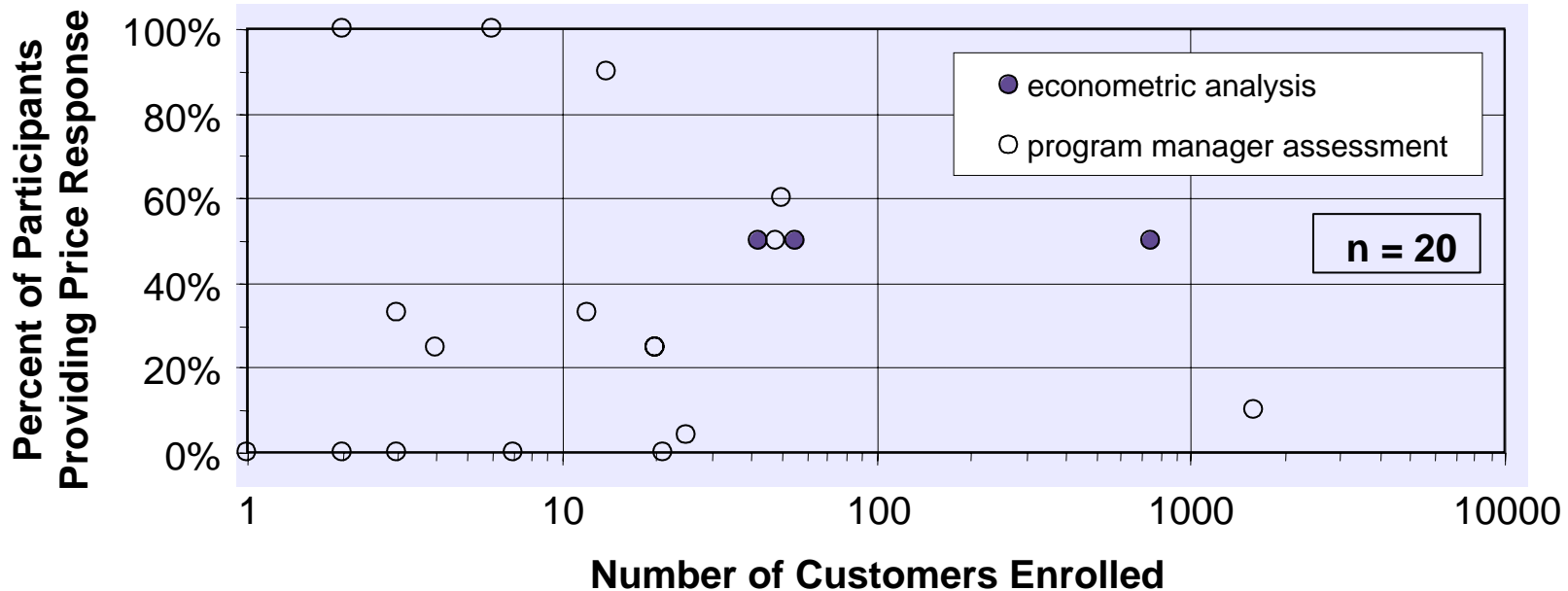
- Majority of the RTP tariffs are bundled
- About 50% use a Customer Baseline (CBL) approach
- Most of the unbundled tariffs are in states that established retail competition

How are real-time prices established?



- Utilities located in regions with ISO/RTO typically use power pool prices
- Most other utilities use their system lambda

Percentage of Participants that Respond to RTP Prices

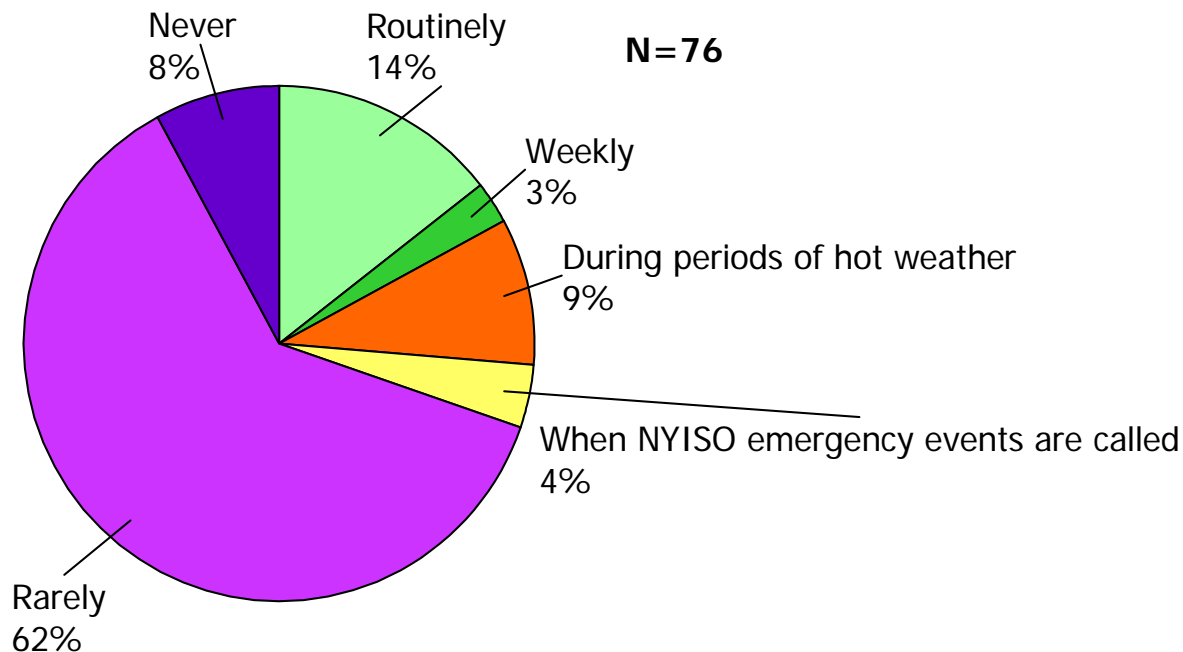


- Among programs with >10 participants, typically <60% of participants are price-responsive
- Many customers enrolled expecting to save on their energy costs without responding on a daily basis
 - Arguably a consequence of marketing strategies and program goals

Barriers to RTP: Most Customers Do Not Check Hourly Prices



- Example: Niagara Mohawk's default RTP program
- 70% of customers exposed to RTP report never or rarely checking day-ahead hourly prices
- 13% check only when other signals (NYISO DR program events or hot weather) suggest prices will be high
- 17% consult prices routinely



Case Studies of Default RTP in the U.S.

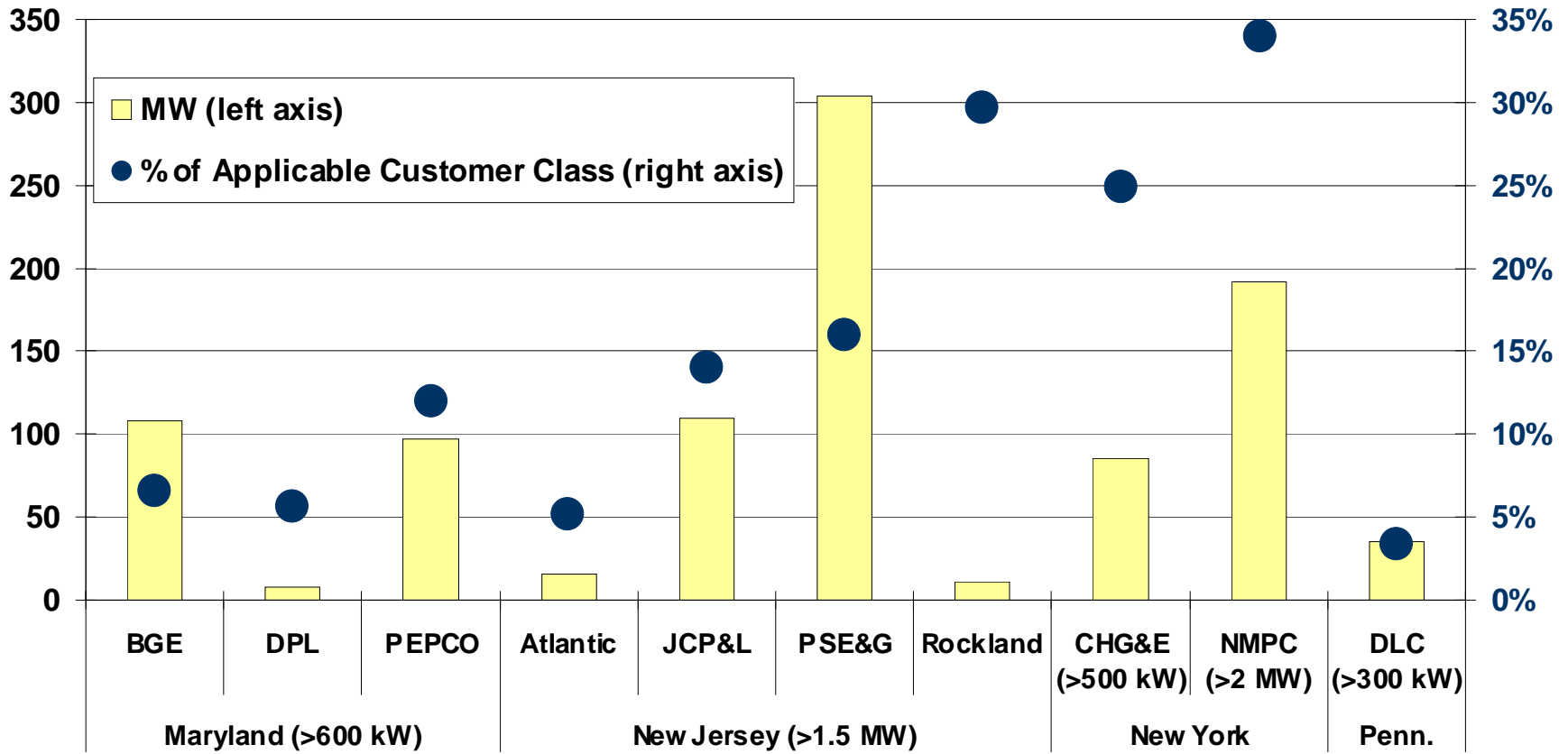


State	Utilities	Year of Implementation	Applicable Customers
New Jersey	Statewide	2003	>1.25 MW
Maryland	Statewide	2005	>600 kW
Pennsylvania	Duquesne	2005	>300 kW
	Statewide	2007 (proposed)	>500 kW
New York	Niagara Mohawk	1998	>2 MW
	Central Hudson	2005	>500 kW
	Statewide	2006 (planned)	Differs by utility
Illinois	ComEd	2007 (planned)	>3 MW
Ohio	Cinergy/CG&E	2005	Returning C&I >100 kW

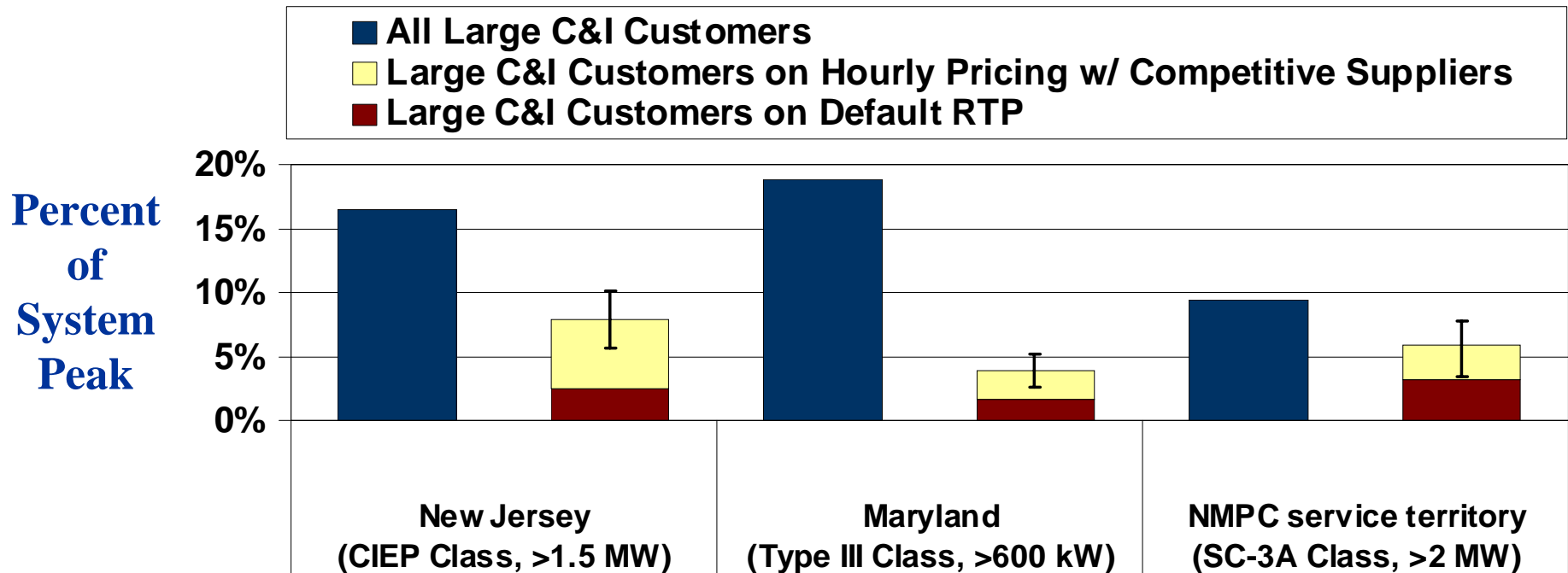
Default RTP Enrollment (a Snapshot)



Default RTP Enrollment circa 2004/2005

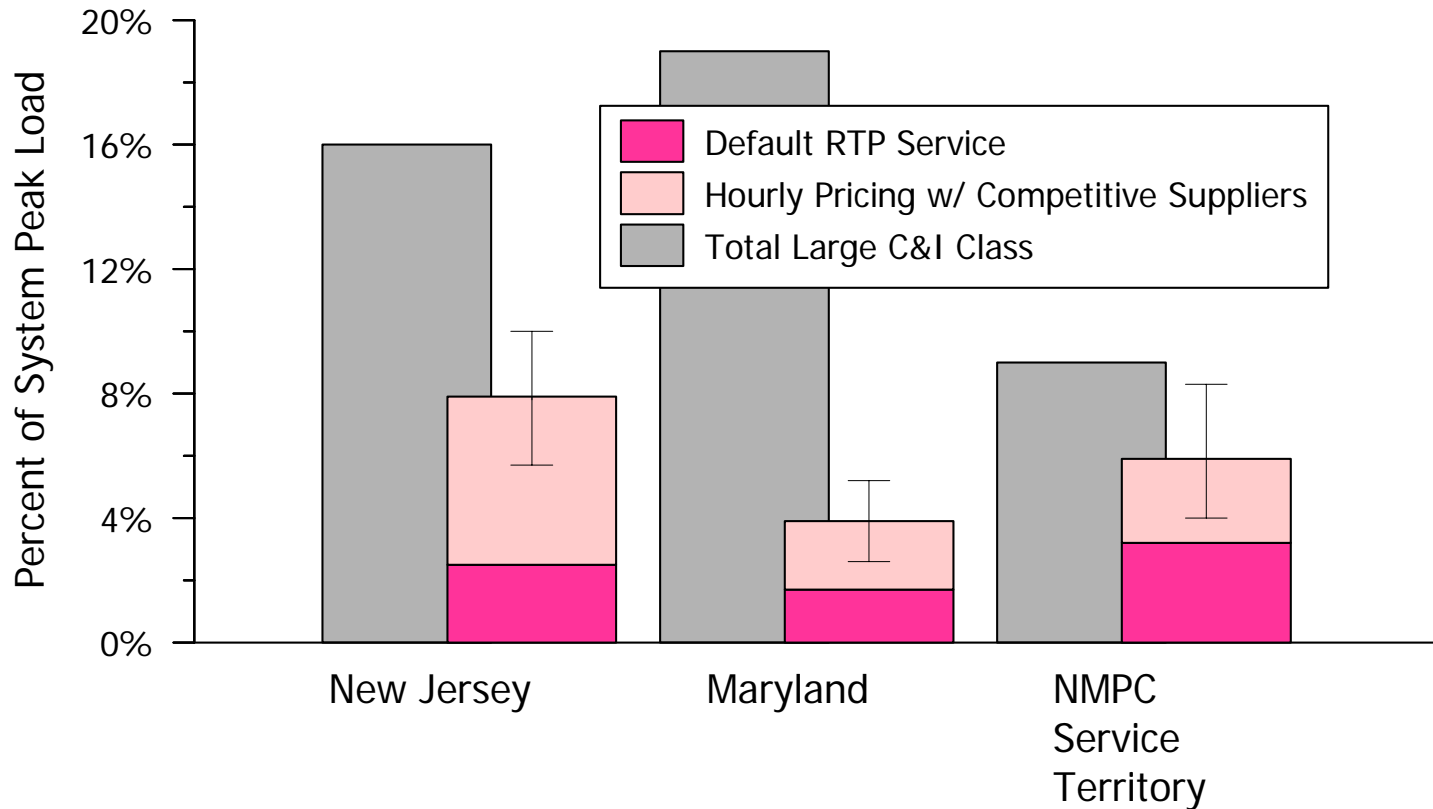


Exposure to Hourly Pricing in Retail Choice States with Default RTP



- Competitive retail contracts are as significant a source of exposure to hourly pricing as default RTP
- 20-60% of large C&I load is facing hourly prices through either default RTP or competitive suppliers (subject to some uncertainty)
 - Equivalent to 4-8% of total system peak load

RTP as Default Service: Customers Exposed to Spot Market Prices



- **Potential market impact:**

- Niagara Mohawk – curtailments equivalent to about 0.6% of system peak load
- New Jersey and Maryland – **unknown**