

# **Pricing and Demand Response**

## **-- Recent Trends and Efficient Markets --**

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*Daniel Violette, Ph.D.  
Summit Blue Consulting  
Boulder, Colorado 80302  
E-mail: [dviolette@summitblue.com](mailto:dviolette@summitblue.com)*

# New Information and Trends

- A new set of pricing pilots/studies are being undertaken.
- Customer acceptance and behavior is one focus of these studies.
- Evidence is growing that customers will accept time-differentiated pricing if they understand the reasons for the pricing plan.
- AND, many customers want options for managing energy costs.
- Regulators and utilities are buying into the concept that demand-side flexibility (pricing and demand response) can:
  1. Reduce price volatility.
  2. Reduce overall system costs for meeting electric demand.
  3. Reduced risks to rate payers – these risks are large and often not accounted for in planning.
  4. Create the business case for innovation in technology designed to manage demand.

# Pricing Options – The Basics

- **Time-of-use (TOU)**: a rate with different unit prices for usage during different blocks of time, usually defined for a 24 hour day. TOU rates reflect the average cost of generating and delivering power during those time periods.
- **Real-time pricing (RTP)**: a rate in which the price for electricity typically fluctuates hourly reflecting changes in the wholesale price of electricity. Customers are typically notified of RTP prices on a day-ahead, hour-ahead, or even settled after the fact for the largest customers.
- **Critical Peak Pricing (CPP)**: The basic rate structure is a TOU rate design. However, the normal peak price is replaced with a much higher CPP event price under specified trigger conditions (e.g., when system reliability is compromised or supply prices are very high).

# Demand Response – Broadly Defined

1. **Price response** -- includes real-time pricing, dynamic pricing, fixed time-differentiated rates (e.g., time-of-use rates), and demand bidding at different prices.
2. **Load response** called for by others -- includes direct load control, partial or curtailable load reductions, load interruptions.

Enabling factors for both include:

- Distributed generation -- includes backup generation and “net” on-site generation.
- Automated controls, enabling technologies and education.
- Information on loads and prices -- helps a customer know how they are doing during a price or reliability event.
- Meters that measure when electricity is used – can range from simple technologies to more complex advanced metering.

# One Recent Legislative Action

- From an Amendment to the Public Utilities, Illinois signed into law Fall, 2006:
  - The efficiency of electric markets depends upon the competitiveness of supply and upon the price-responsiveness of the demand for the service.
  - Therefore, to ensure the lowest total cost of service and to enhance the reliability of service, all classes of electricity customers of electric utilities should have access to and be able to voluntarily use real-time pricing and other price-response and demand response mechanisms.
  - In accordance with this law, Illinois utilities have outsourced the management of day-ahead real-time pricing programs to experienced program managers.
  - Reference: <http://www.ilga.gov/legislation/publicacts/94/094-0977.htm>

# Political and Policy Climate for Expansion – One Jurisdiction

- Illinois legislators were concerned about the failure of a competitive (or any) retail market to emerge for small customers
- Rates for the two largest utilities were expected to increase substantially in 2007 -- ComEd flat rates to increase 22-26%, Ameren rates by 40-50%.
- Experience of the residential day-ahead hourly pricing pilot (Energy Smart Pricing Pilot) program showed savings for participants and benefits to the system through demand response.
- Legislators, consumer advocates and other public interveners have gave support to RTP-DA as a rate option to provide consumer choice and reduced costs.

***[More information on the ESPP can be obtained from Kathy Tholin, Chicago Energy Cooperative – [Kathy@cnt.org](mailto:Kathy@cnt.org)]***

# Illinois Legislator

“This just seems to make eminent sense to me-- if you're in a position where you can hold out in the heat of the day and run your air conditioner at night, you're gonna save some money”

- Representative William Black (R-Danville) during floor debate on SB1705, April 4, 2006

# Consumer Advocate

“Citizens Utility Board (CUB) and the City view ComEd’s Tariff as a necessary and important step toward the development of substantial demand response that can provide the discipline lacking in the markets today.”

- Testimony of Chris Thomas, Citizens Utility Board in support of ComEd rate filing in Docket 06-0617, October 31, 2006

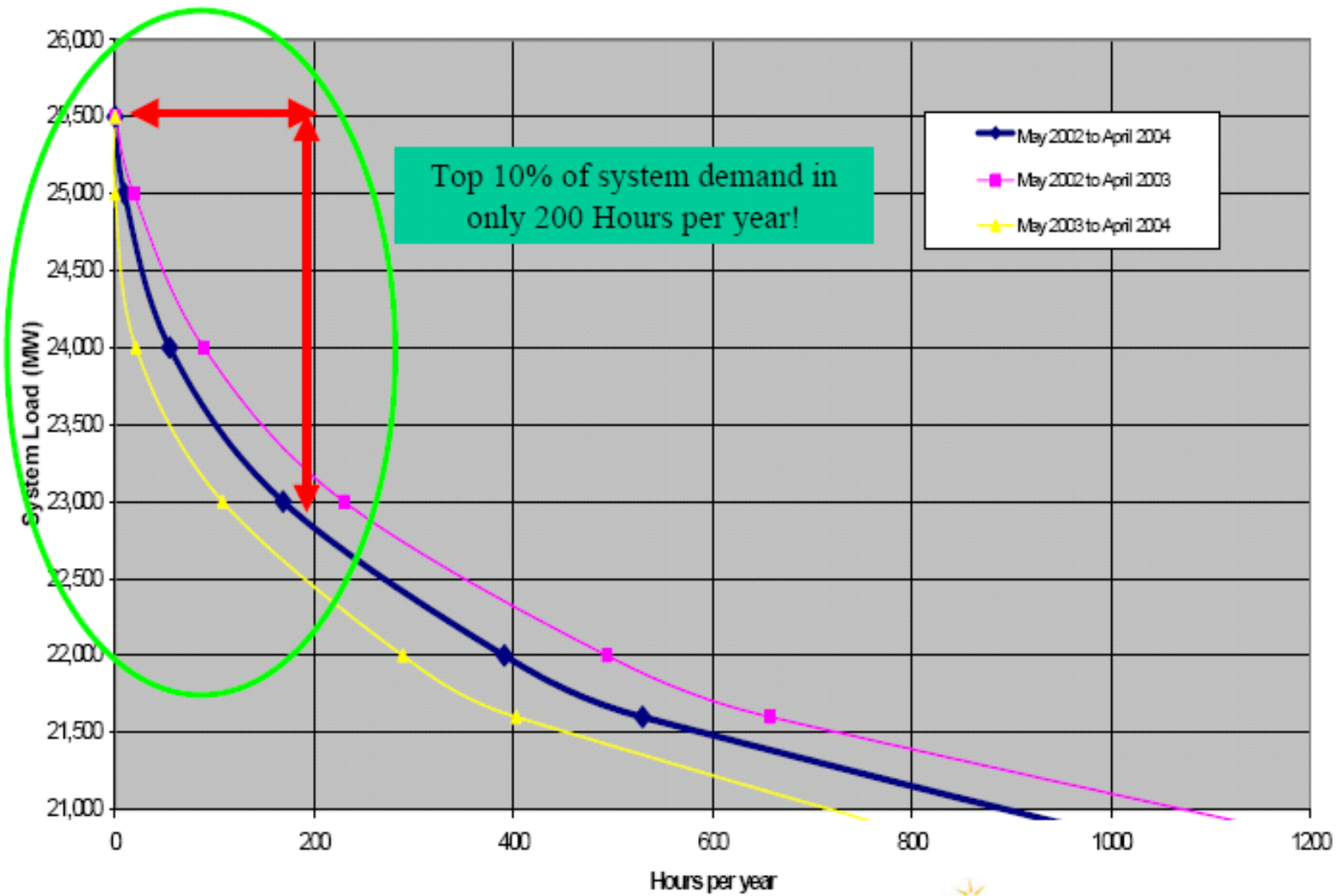
# Back to Basics

- Pricing and demand response are important to the continued development of wholesale and retail markets.
  - Competitive markets are based on the interaction of supply and demand in response to price signals.
  - However, the history retail pricing of electricity is one of regulator-approved rates that, generally, do not account for costs that vary across hours.
  - Yet, electricity prices are among the most volatile of any commodity.
- So, what are markets about?
  1. Markets should be designed to to allocate resources efficiently.
  2. This is done through price signals.

# Bottom Line for Markets

- ***If we don't "price what's scarce"*** (e.g., peak-period commodity) -- How do we incent demand-side innovation?
- ***If we don't price what's scarce*** -- How do we improve supply-side productivity in one of the country's most capital-intensive industries?
- ***This is a long term value proposition*** -- incorporating economic demand response capability will promote efficient resource investments over time.
- ***Pricing right will result in appropriate supply-side investment*** -- the electric industry across North America has proposed large-scale investments in infrastructure and appropriate demand-side resource commitments are needed to ensure appropriate supply-side investment.

# Example: Ontario Demand Situation



# Benefits from Efficient Pricing

- Providing customers with fair choices and options to manage their electricity use provides market benefits:
  - **Increased system reliability** as price mitigates demand when resources become scarce.
  - Appropriate pricing inducing appropriate investment will **reduce the costs of electricity to all customers** in a regional market.
  - Allowing customers to manage part of the price and commodity risks can **lower overall market risk management costs**.
  - **Environmental benefits** by promoting efficient use of resources.
  - **Market power mitigation** by providing a demand response to offset high prices for generated electricity by providers.
  - **Provide incentives for technical innovation** -- a business case for load shifting technologies.

# What Would Happen If:

- All customers woke up tomorrow and found themselves on a real-time pricing (i.e., prices that varied hourly reflecting costs)?
  - Many would not notice much of a difference (*if current average rates reflect average costs*).
  - Why? Customers would receive a monthly bill that still represents an averaging of electricity costs across the month.
  - This average would be based on their electricity use in each hour multiplied by the price for that hour.
  - Large users might find it in their interests to manage usage hourly, but most customers would make “rough-cut” adjustments.
  - For most customers, **annual energy costs** would not vary by more than 5% up or down; *although, this is an empirical question for each utility.*

# What Would Happen (cont.)

- Customer bills would be higher in some months (e.g., summer) and, lower in other months.
  - NOTE: Most utilities offer budget billing which can address this issue, i.e., the bill can be levelized across months.
- A key customer attribute that influences their service costs, i.e., the ability to shift electricity use from peak to off-peak hours, will now be rewarded with lower monthly bills.
- Increased equity -- customers that consume more energy during high priced hours end up paying more in their bill.
- For customers whose bills do increase by more than an acceptable amount (e.g., 5% in one year), utilities can follow the time-honored rate-setting process of phasing in price changes.

# What has been accomplished?

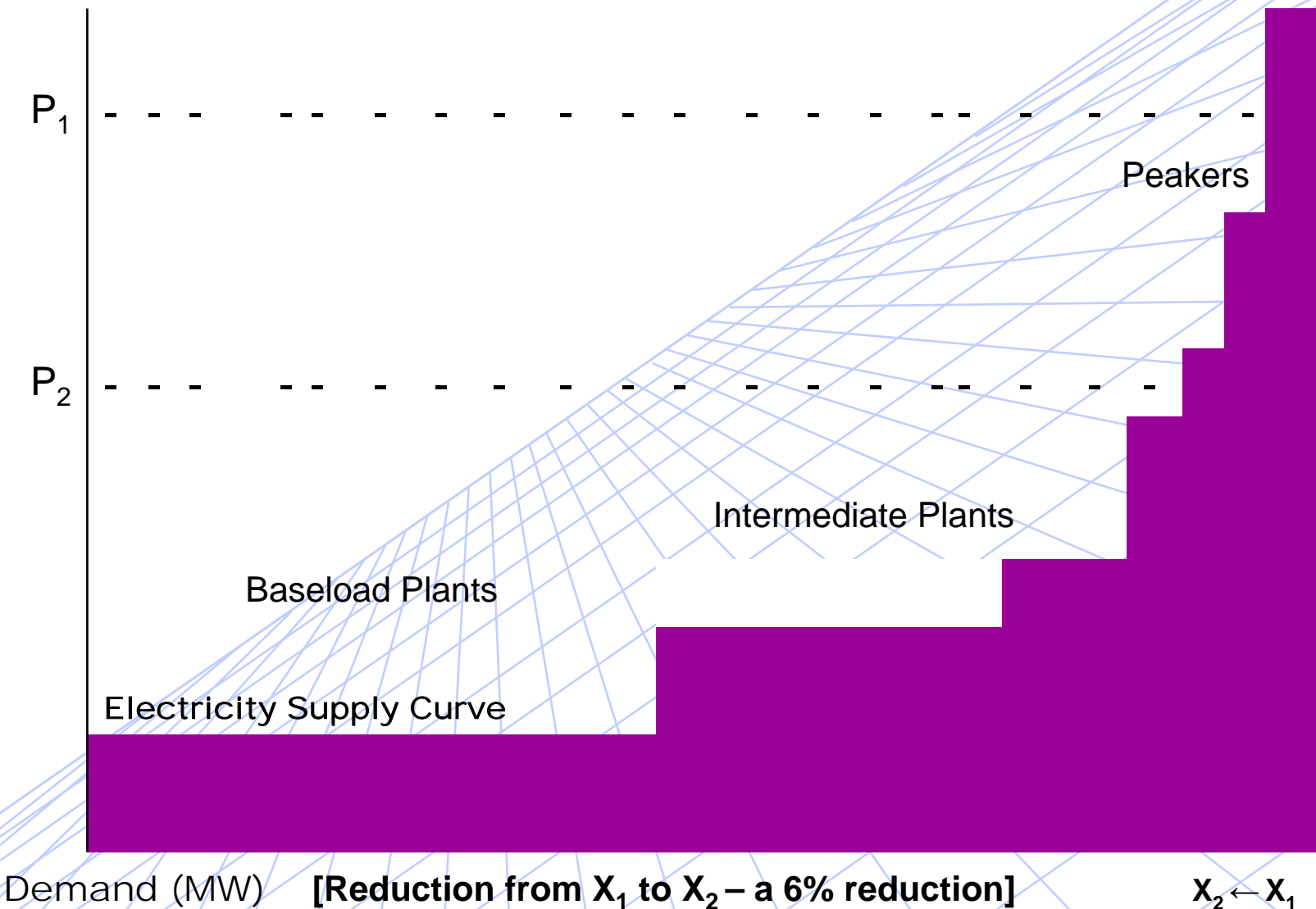
- Now, customers receive a monthly bill based on an average of prices not much different from what they received in the past.
- But, these bills are the average of the Real-Time Prices across hours in a month (i.e., hourly kWh times real-time prices).
- Customers are not expected to check electricity prices every hour, but they would generally know the hours in which electricity is most expensive.
- Signals can be sent to customers warning of “high-price” days.
- Modest adjustments in pricing that produce a 3% to 5% change in peak demand could have substantial effects on the overall generation, transmission and distribution infrastructure.
- A 5% to 10% change could be truly dramatic, and studies have shown that a changes in use of this size are attainable.

# Impact of Demand Reductions from DR or from Price Response



Price  
Based on  
Wholesale  
Costs

A 6%  
reduction in  
demand can  
result in a  
40%  
reduction in  
price on  
high  
demand  
days



# What has been accomplished?

## Creating the business case for Innovation:

- Importantly, the newly rationalized electricity market can support business cases for innovation and enabling technologies.
- Technology companies can develop equipment that will allow customers to manage demand, while quite possibly increasing overall comfort and providing other benefits.
- The business case for the development of these technologies depends, in large part, upon the dollar savings resulting from managing demand.
- Appropriate pricing that reflects what is costly and scarce will allow customers to be passive and still save money as technology develops.
- Allowing for this innovation will contribute to a strong regional economy with lower electricity rates and lower risks associated with energy costs.
- Consumers, industry and ratepayers will be better protected against adverse futures – e.g., high input fuel prices combined with high environmental costs.

# Pricing as Risk Management

- Innovative pricing can lower peak demand and increase plant capacity factors by shifting demand to lower cost periods.
  - In the long run, this should lower overall system costs and increase the returns on invested capital.
  - Risks are decreased by reducing or deferring the number of capital-intensive projects needed.
- Supply-side risks are increasing:
  - Clean coal technologies are not fully proven and costs uncertain (e.g., IGCC plants).
  - Fuel costs are increasing and likely to remain volatile.
  - Environmental mitigation costs represent substantial uncertainties:
    - Carbon mitigation
    - Land use issues (transmission corridors, wind farms, plant siting)
  - The rail system and gas pipelines present infrastructure uncertainties.

# Bottom Line

- Those working on the design and/or regulation of electricity markets need to develop price signals that provide incentives to manage what is scarce.
- Is there a rationale that justifies not taking action?
- Proxy pricing through demand response programs also can achieve this goal – but, event-based programs often have limitations on the number of times they can be called.
- With appropriate price signals, sizeable efficiencies can be gained and infrastructure costs reduced.
- Customer and ratepayer risks associated with high electricity costs will be reduced – a key benefit.

**END RESULT – Regional energy needs will be met at a lower cost over time and at a lower risk of adverse energy futures.**

# Questions:

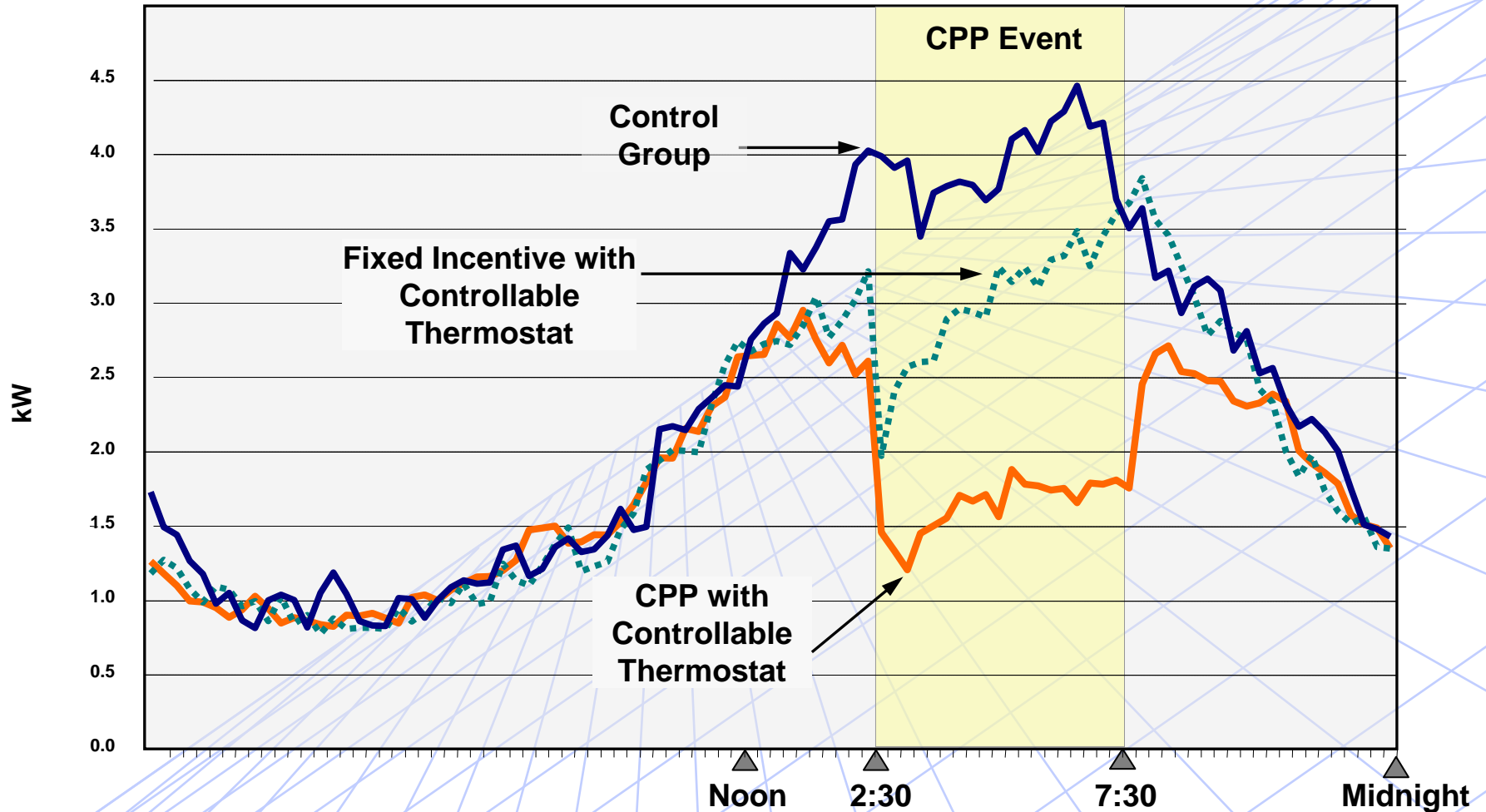
- If we do want DR and time-differentiated pricing, what is the transition path that will get the industry to appropriate pricing?
  - How fast?
  - How much?
  - What segments?
  - At what cost?
  - What amount of change in a customer’s bill is acceptable?
- Are there economies of scale in application of innovative rates?
- If we don’t “price what is scarce” market-wide; then, how can we get economies of scale in new technologies that promote energy management?
- How do technology providers justify a business case for innovation if there is not a commitment to appropriately price what is scarce?

# What is Known:

- Solid research supports demand reductions in response to prices and callable DR programs:
  - California AutoDR project (40 Commercial Sites over 4 years):
    1. Develop low-cost automated infrastructure to improve DR capability in California.
    2. Evaluate readiness of commercial buildings and industrial facilities to receive common signals
    3. Evaluate the capability of load shed capabilities and measurement of loads that are shed to improve future buildings.
  - Facilities averaged 10% to 14% demand reductions and included:
    - Banks, Groceries, Big Box (e.g., Target), Malls, Manufacturers and Offices, among others.
  - Average 10% to 14% demand reductions.
- Residential and small commercial programs are getting 8% to 14% without technology, and up to 20% with enabling technology.

# From California State-Wide Pricing Pilot:

## Average Residential Response to Critical Peak Pricing

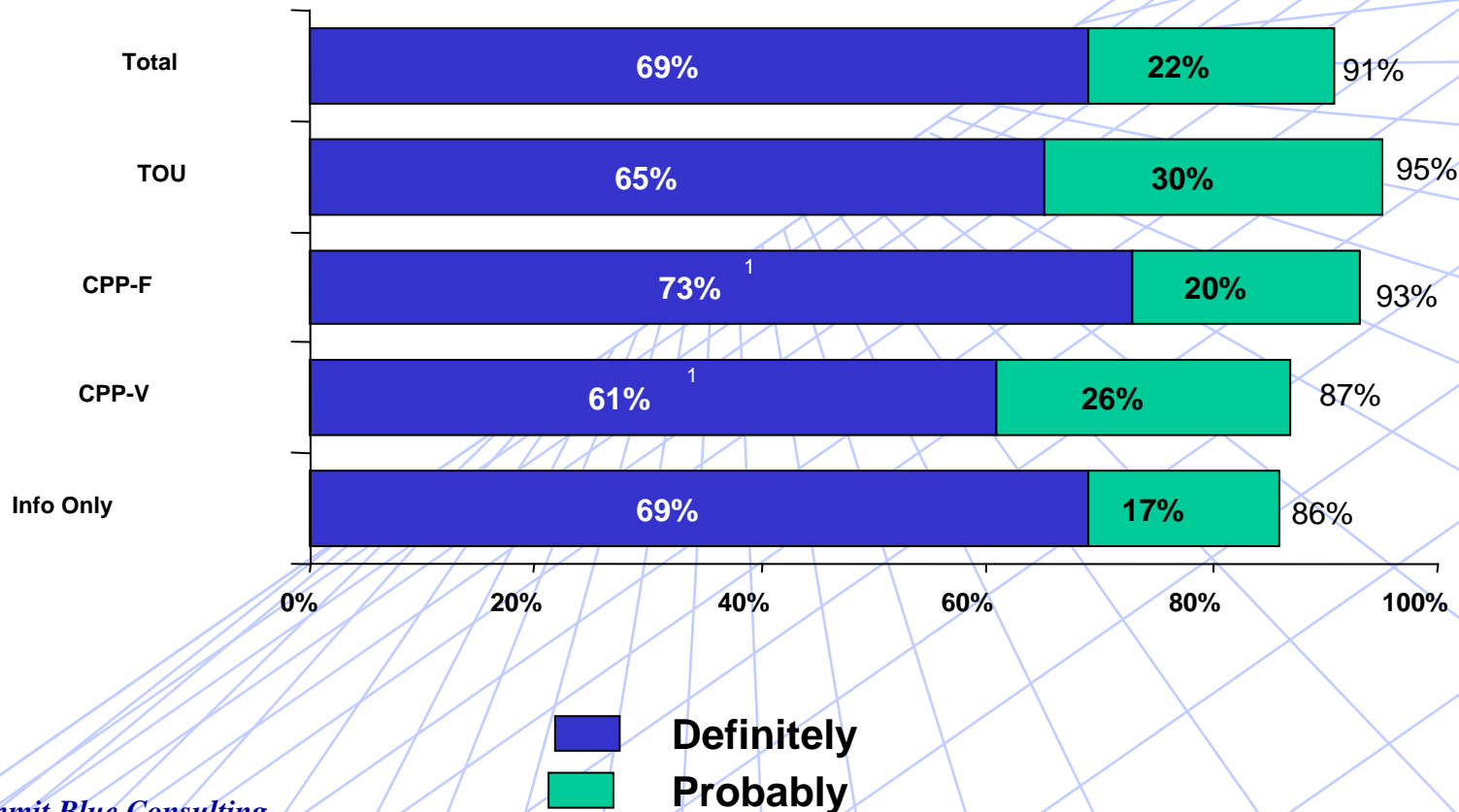


Source: Mike Messenger, CEC on loan to the OPA, ON - [Mike.Messenger@powerauthority.on.ca](mailto:Mike.Messenger@powerauthority.on.ca)

# What is Known:

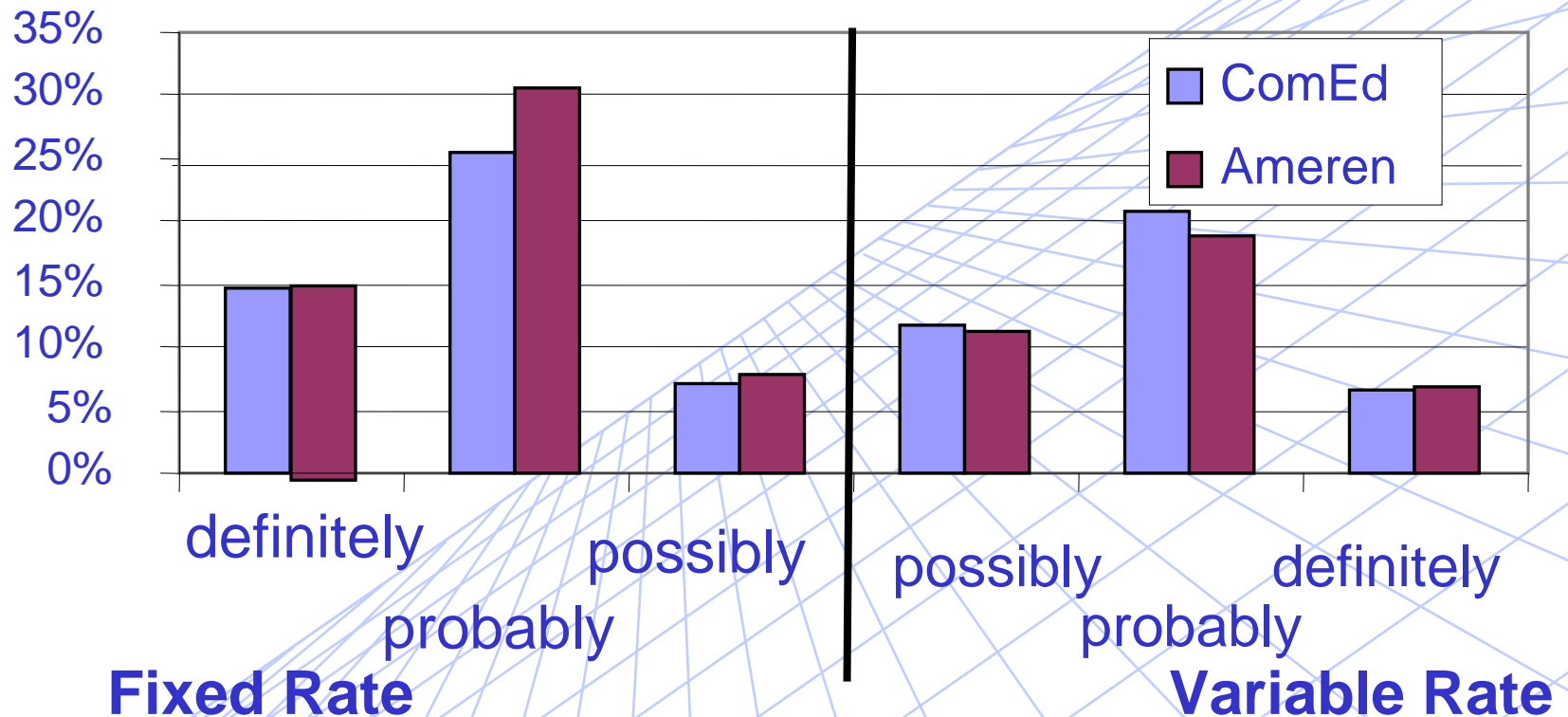
Participants after participating in California State-Wide Pricing Pilot were asked:

**Should dynamic rates be offered to all customers?**



# Illinois: Gauging Residential Customer Interest in DA Real-time Pricing

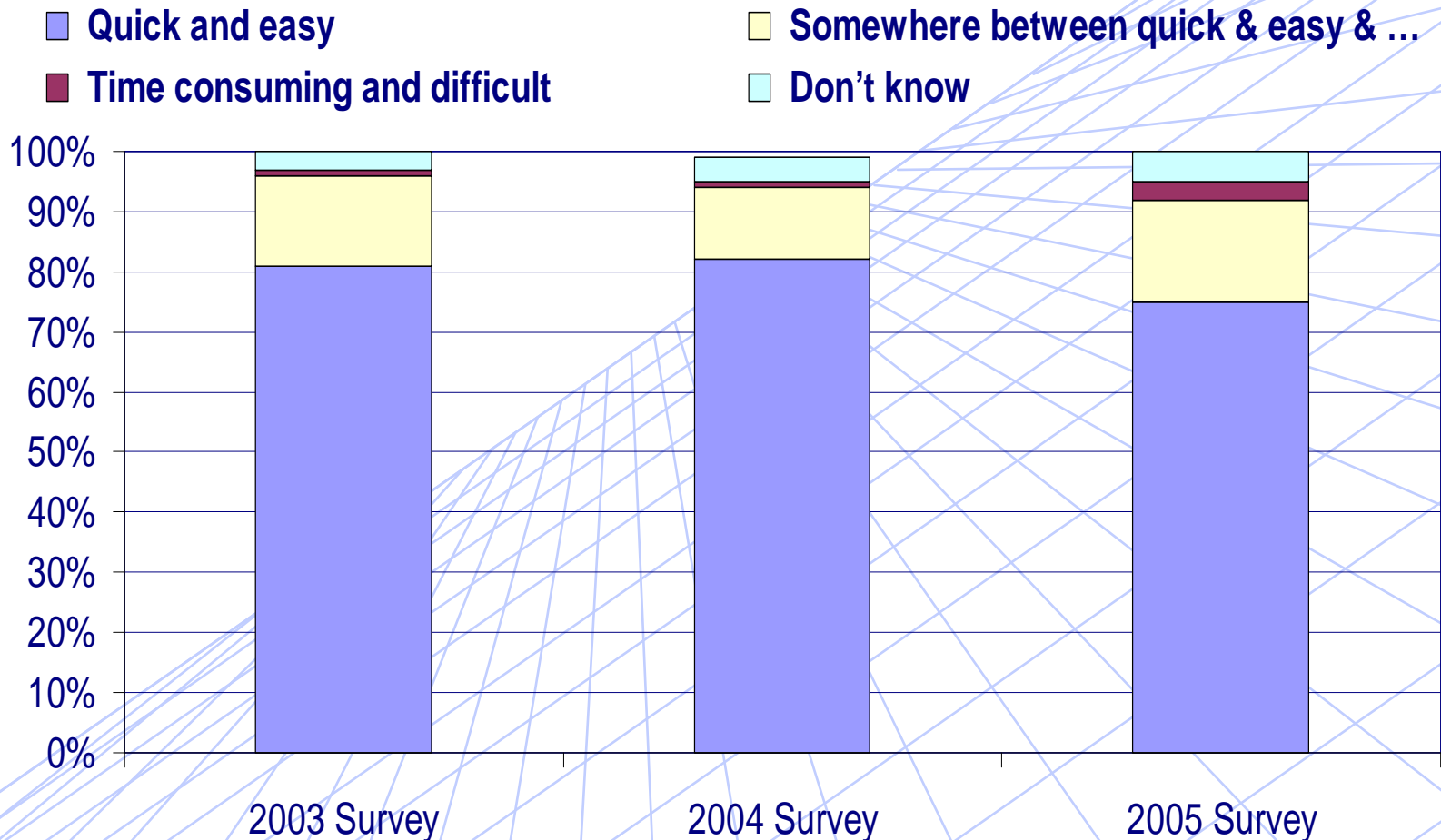
**Would You Be Interested In A Fixed Or Variable Rate Plan?**



[Summer 2006 Survey. 282 ComEd, 399 Ameren households]

# Its Not Hard to for Customers to Do: Participating In ESPP Has Been...

From the Chicago Energy Cooperative Energy Smart Pricing Pilot (ESPP):



# What is Known:

- It is possible to develop a pricing regime that makes things worse:
  - This would be a pricing scheme where customers and utilities incur costs without obtaining the reductions in peak demand and shifts in load needed to achieve the desired benefits.
- But, good pricing policies can be designed using existing technology with pragmatic options (e.g., see ComEd / Chicago Energy Cooperative RTP Pricing Program)

**“The world hates change, yet it is the only thing that has brought progress.” *Charles Kettering***

## Contact Information:

Daniel Violette, Ph.D.  
Summit Blue Consulting  
1722 14<sup>th</sup> Street #230  
Boulder, Colorado, 80302  
Phone: 720-564-1130  
[dviolette@summitblue.com](mailto:dviolette@summitblue.com)