Demand-Side Resources and Electricity Markets

A Policy Agenda for New England

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Massachusetts Electric Restructuring Roundtable

March 23, 2001

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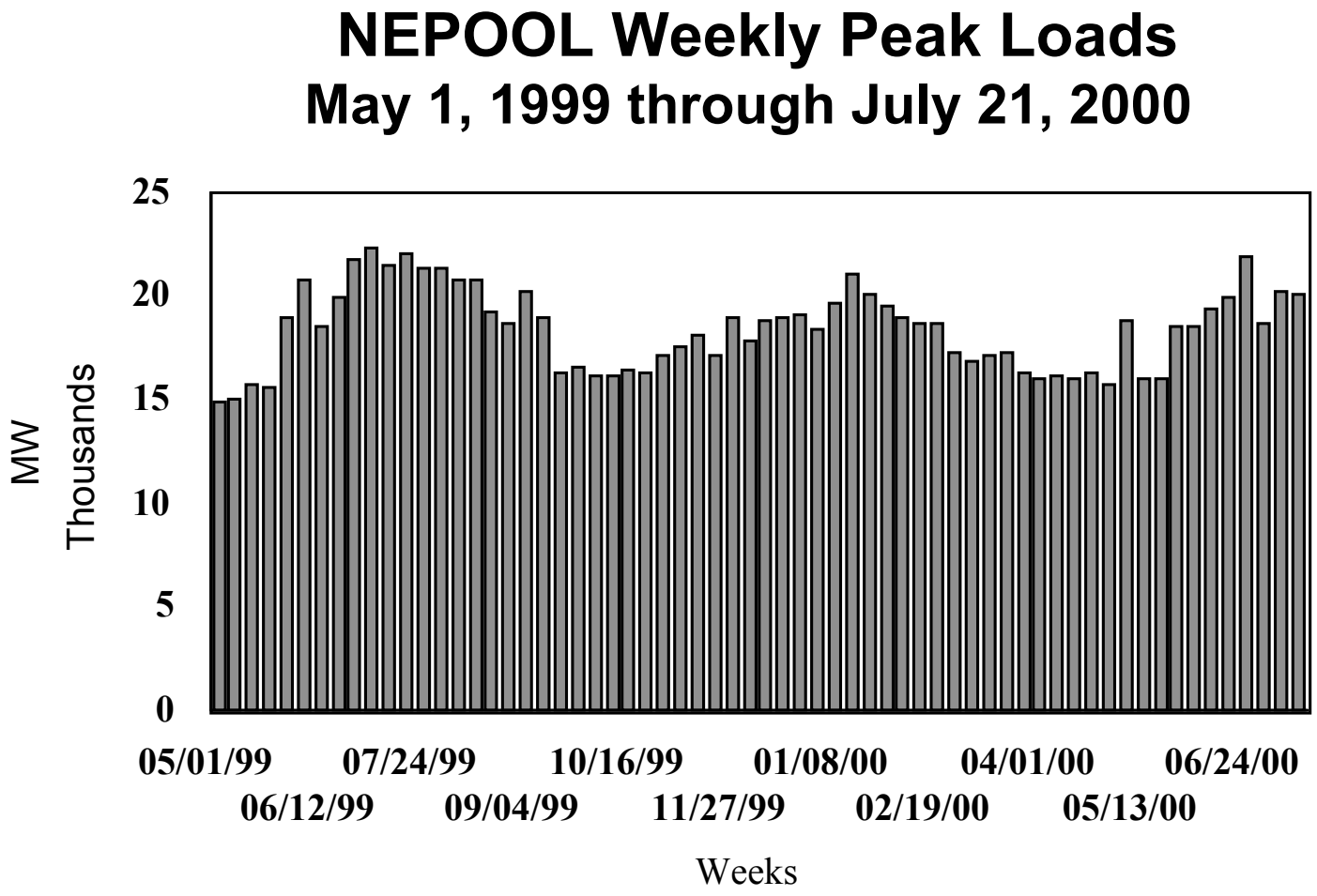
4 Basic Points

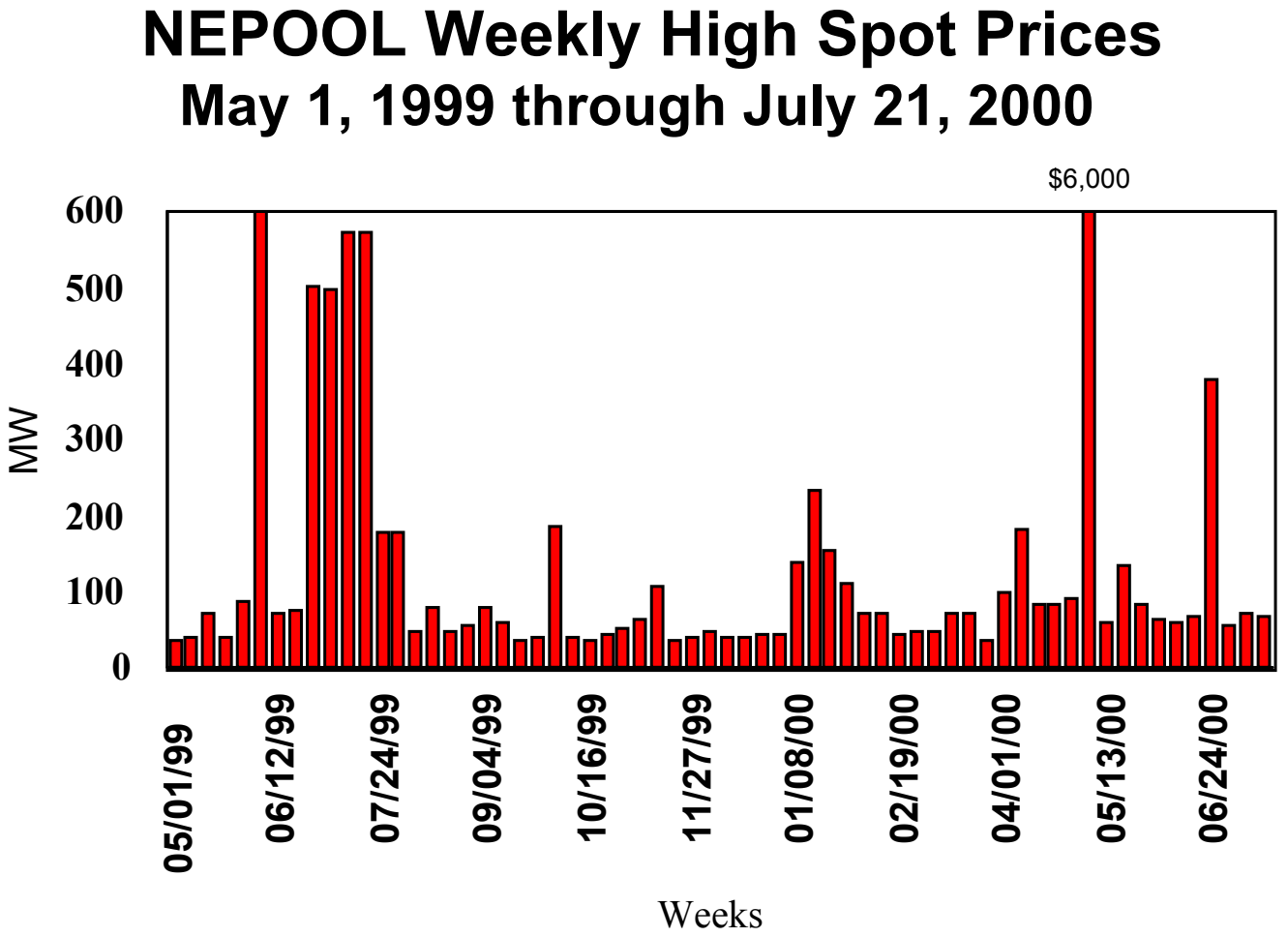
- (1) Load growth and current market structures are causing serious problems;
- (2) The pain is unnecessary: efficiency and load management offer low-cost, cleaner, reliable solutions;
- (3) Market reforms will enable demand responses to stabilize power markets;
- (4) "Baseload efficiency" is also critical -- market, governmental, and regulatory actions needed here too.

New Problem #1: Price Spikes

Weekly peaks vary by 50%



While weekly peak PRICES vary by 10,000%!



New Problem #2:Market Power

- Market Power: "The ability of a producer to affect prices through output or pricing (bidding) decisions"
- High prices in thin markets -- higher than effective competition would produce
- California: + $10 Billion and counting
- Rising concentration in generating capacity:
  - Just 10 companies now control > 50% of IOU generating capacity; The largest 20 companies control more than 72%
  - In regional markets, it's even higher
  - We're back to 1935

New Problem #3: Reliability

- Outages, warnings, close calls in several regions
- Symptoms vary:
  - Transmission overload (West-wide)
  - Generation adequacy (NE, CA 2000)
  - Load pocket peak (SF 2000)
  - Distribution overload (Chicago, NY 1999)
- Causes vary, too -- but all are related to growing loads

New Problem #4: Monopoly without portfolio management

- Half of the nation: still in franchise
- The other half: Power supply is 95% default service (a monopoly)
- Everywhere:
  - Wires -- 100% monopoly
  - System operation, reliability rules are centralized, regulated operations
- IRP left behind, but
- Portfolio management still essential

Strategic Energy Choices

- A. Supply-side facilities
- B. Reforming energy markets
  - Demand-side bidding, price-responsive load at wholesale
  - Real time pricing at retail
- C. End-use energy efficiency
  - Market transformation, utility, and governmental programs
- D. Portfolio management: all of the above

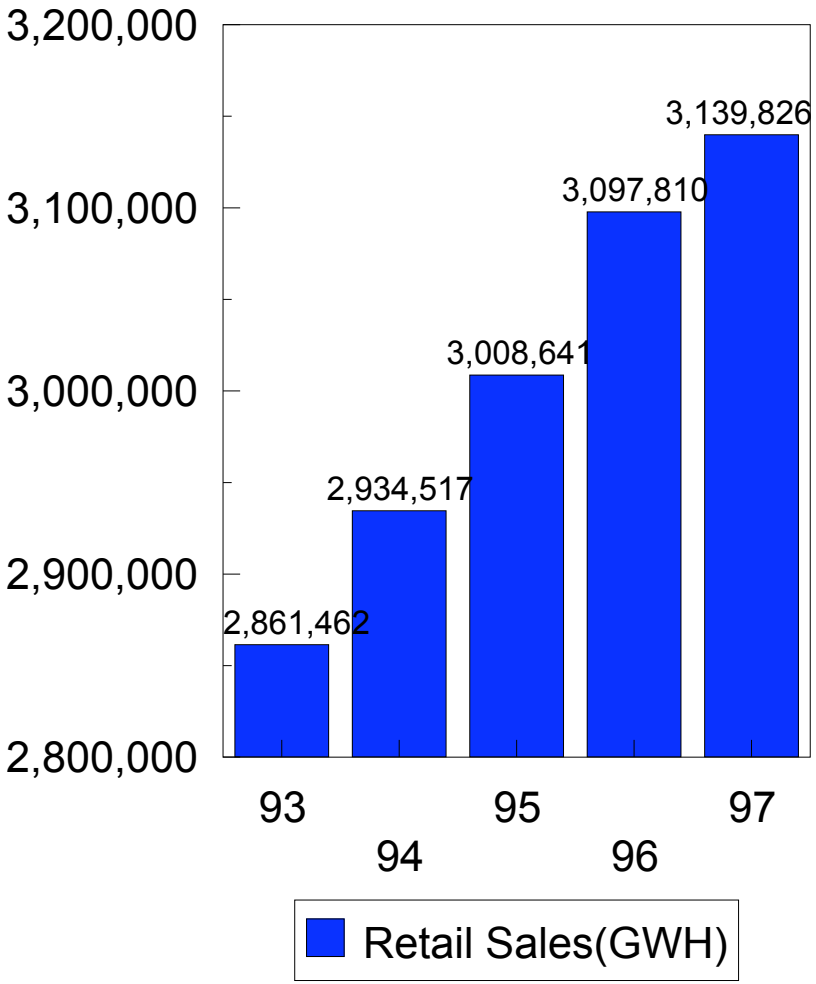
Challenge for NE ISO

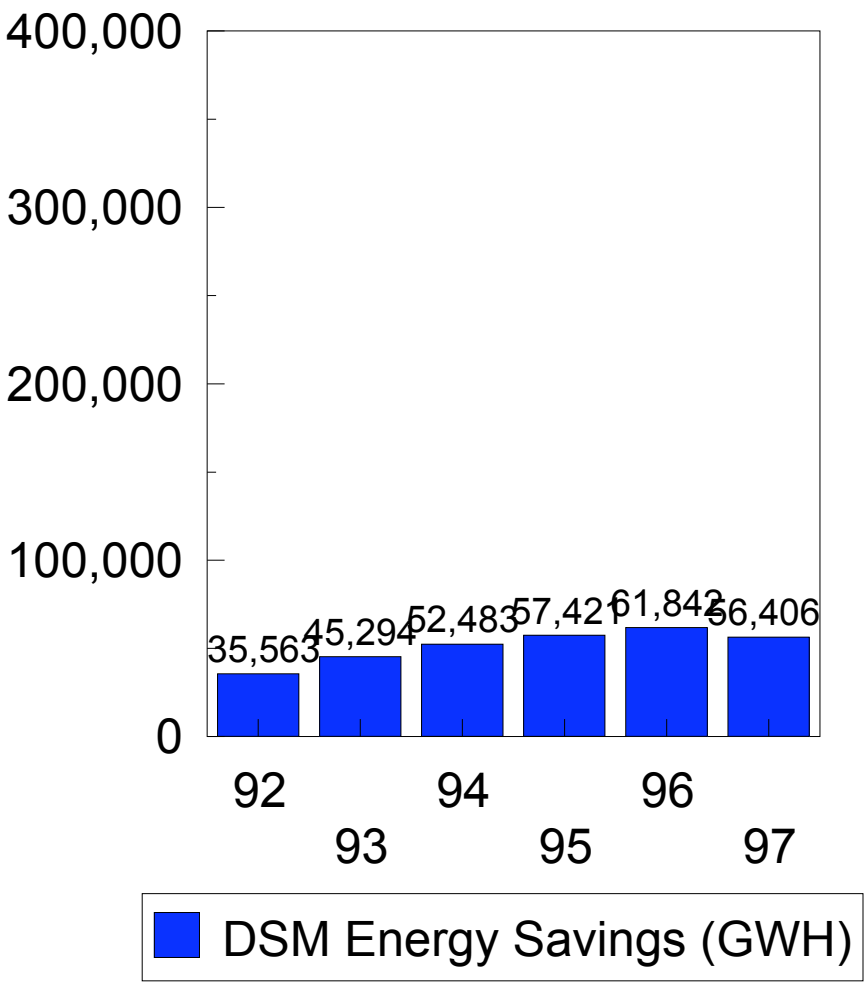
- Wholesale rates and markets are not "just and reasonable" if structural flaws impose unnecessarily high costs on consumers.
- Costs will be unnecessarily high unless the wholesale market is structured to allow LSEs and demand-side managers to realize the wholesale value of their services.
- To realize those values, the wholesale market must: (a) remove cross-subsidies and barriers that undermine cost-effective efficiency and load management; (b) include demand-side bidding; and (c) support cost-effective energy efficiency investments

Load growth: Can Turbines and Wires Do It?

- **Sales up 31% last decade;**
  - **--another 37% in this decade?**
- **Peak loads growing rapidly**
  - summer peak up 56,000 MW in 4 years
  - NERC predicts +160,000 MW, 1999-2010
  - We're adding the electrical equivalent of an entire New England every 14 to18 months
- **DOE forecast: adding the equivalent of Japan and Germany to the US grid by 2020**
- **Can we build and run over 300,000 MW of new capacity?** What are the transmission, emission and cost consequences?

Reliability Myth: It's All About Supply





Lighten the Load

- Demand-side initiatives will help with all four problems: price spikes, market power, reliability, and portfolio balance
- Exclusive supply side focus: the never-ending problem of weakest links
- Demand-side resources: can be cheaper, cleaner, faster
- Reliability benefits for the entire network -- from local wires to regional fuel supply
- Power cost benefits, too

Competition Myth: Load Will Respond to System Costs

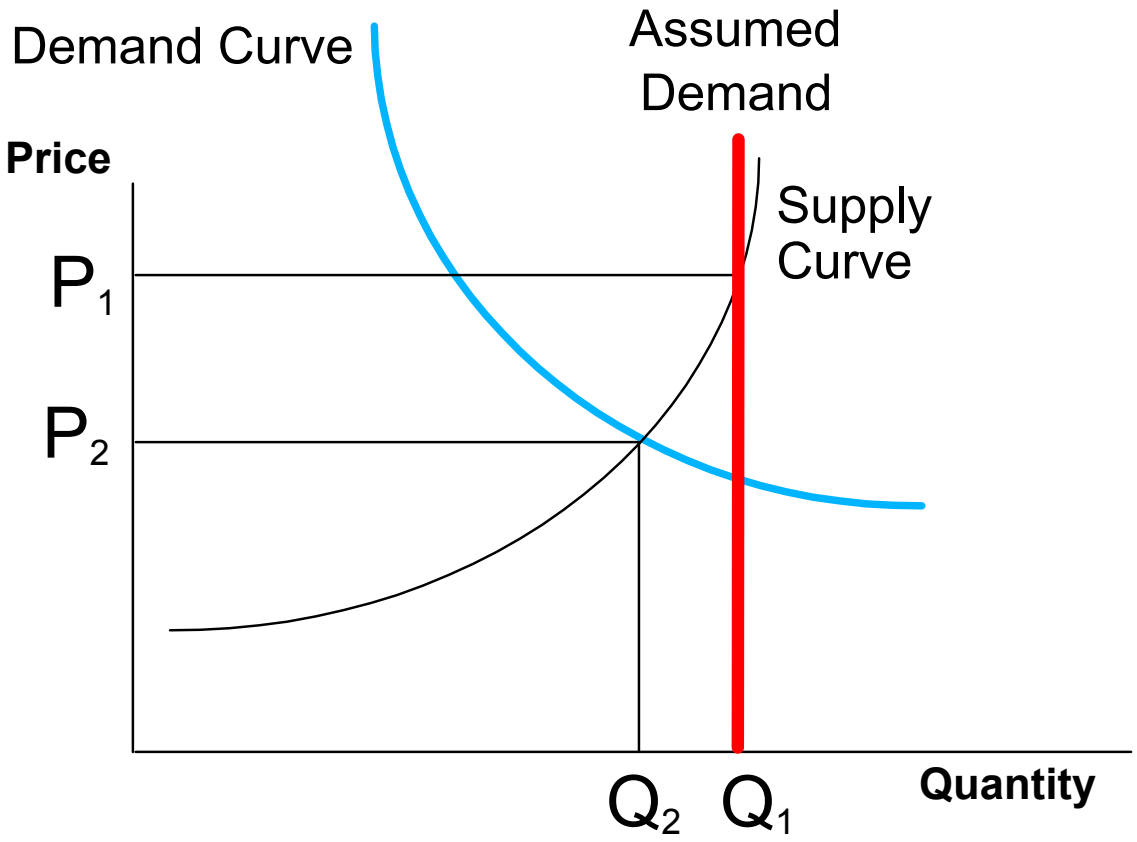
- Customers see average prices, and they see them long after consumption
- Few customers on interval meters or real-time prices
- Many generation and reliability costs are socialized
- Low, fixed default service prices blunt customer interest in both EE & LM
- Historic market barriers to efficiency remain: first-cost, discount rates, information barriers etc.

More Anti-efficiency practices

- **Load profiling by pools or RTOs**
  - An LSE charged for usage on a customer profiled basis will not benefit from high-value peak-load reductions

    unless a new profile is created for those customers
- **Reliability rules and practices favor turbines and wires solutions--**
  - "Dispatchable load" often cannot compete fairly with generation in ancillary services markets
  - Demand-side options not permitted to compete with generation and wires for uplift and other "socialized" support.

Discovering the Demand Curve



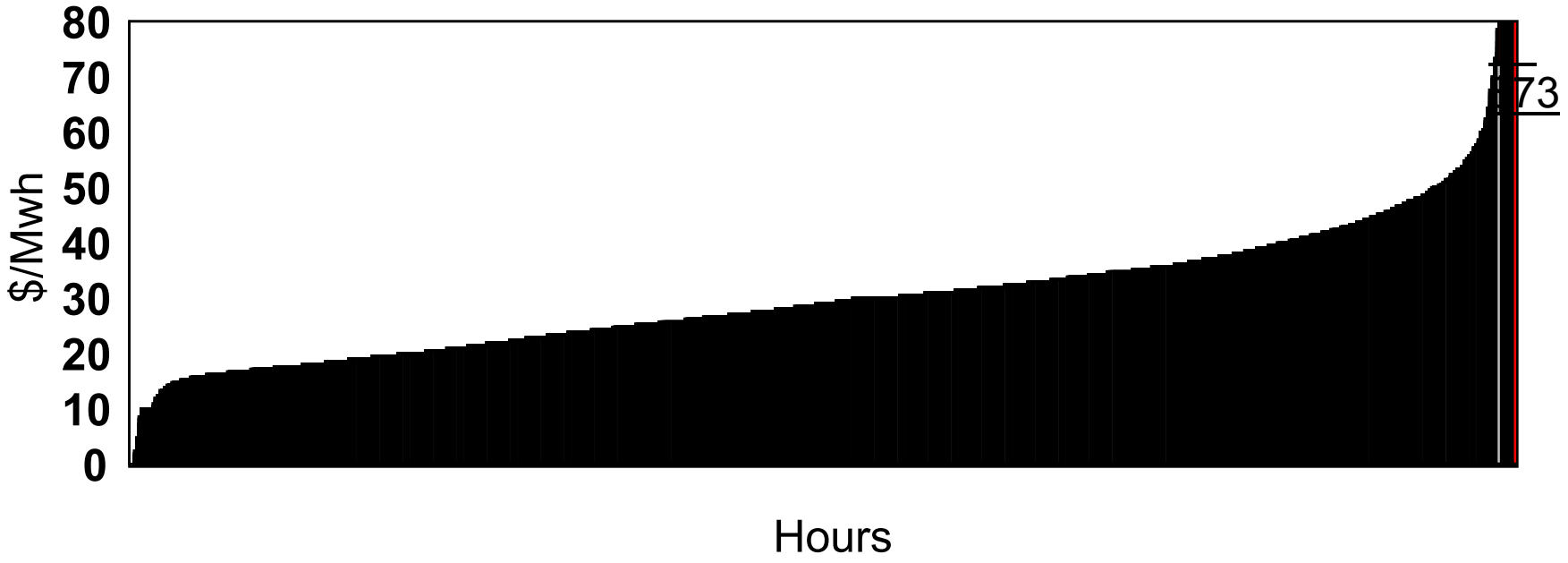
Solution Menu (A): Wholesale Market Features

- (1)Demand-Side Bidding:
  - Price-sensitive load bids reveal a real demand curve
  - Reform load profiles to support demand mgt
- (2)Multi-Settlement Markets:
  - Day-ahead settlement permits economic resales of load reductions
- (3) Demand-Side Reserves:
  - "Dispatchable load" as an ancillary service
- (4) Efficient Reliability Standard:
  - Least-cost approach to reliability charges

1% of hours = 16% of annual spot power costs

New England Spot Energy Prices

12 Months Ending July 21, 2000

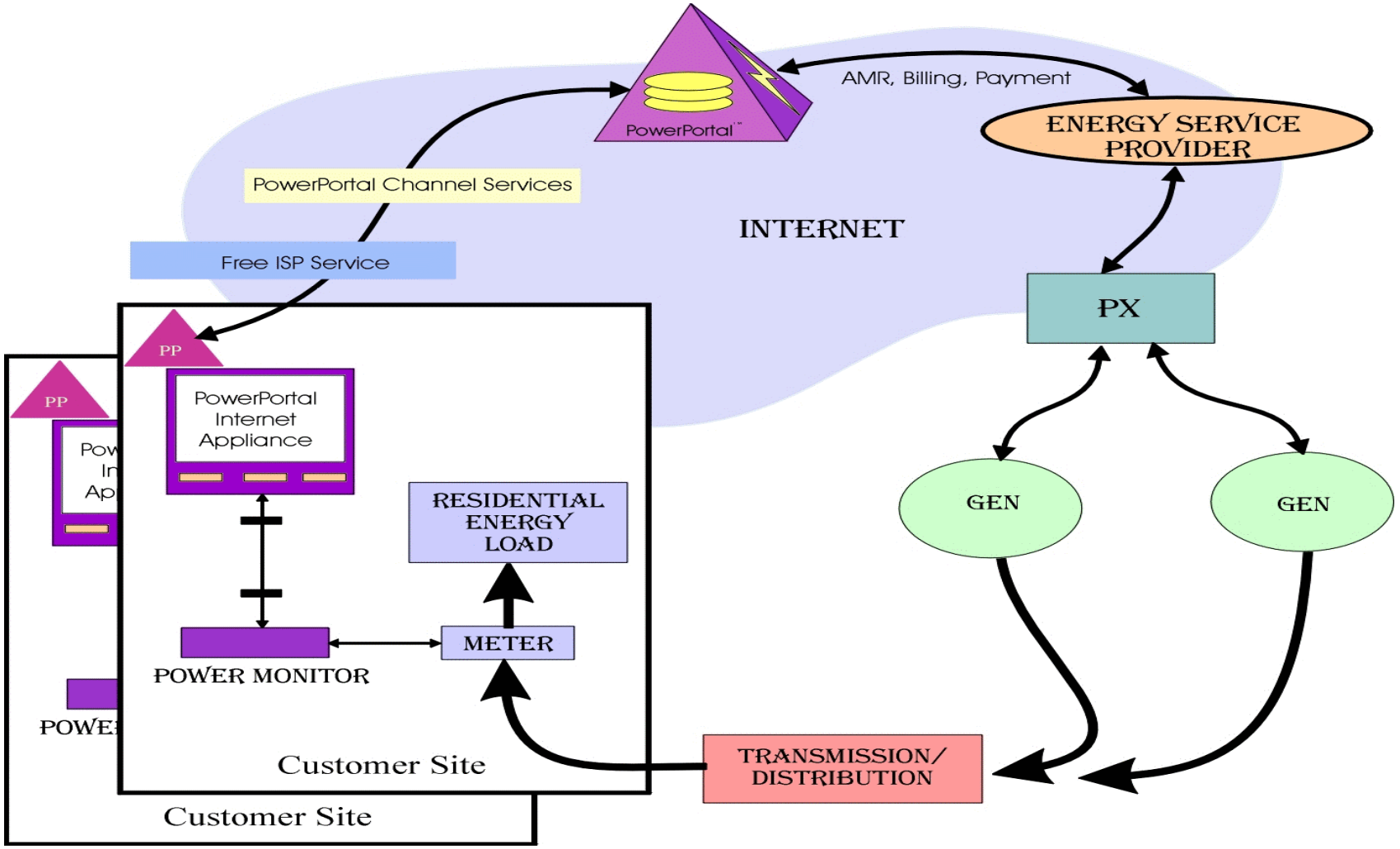


Max = $6000/MWh, May 8, 2000
1% of hours above $73/MWh
Top 1% of Prices equal 15.8% Wholesale Costs (weighted by load)

Load Response Reservoir

- **SAIC study of responses to real-time prices (1995):**
  - ~17% of peak load is discretionary and could respond to price signals
- **E-Source survey of large firm energy managers (2000):**
  - ~15% of large-firm load could be price-responsive in the short run
- **Key concept:** demand buy-back markets

New Business Model



Reforming Load Profiles

- LSEs charged for usage on a customer profile basis
- LSE does not benefit from high-value peak-load reductions unless a new profile is created for those customers
- LSEs don't see real time prices
- LSEs cannot capture benefits of efficiency or LM

Efficient Reliability Decision Rule

- **Before "socializing" the costs of a proposed reliability-enhancing investment through uplift or tariff, PUCs and FERC should first require a showing:**
  - that the relevant market is fully open to demand-side as well as supply resources;
  - that the proposed investment is the lowest cost, reasonably-available means to correct a remaining market failure; and
  - that benefits from the investment will be widespread, and thus appropriate for broad-based funding.

Solution Menu (B): Rates and Rules for the Wires

- **(5) Transmission Congestion Pricing:**
  - reveals value of DG, EE, and LM
- **(6) Enhancing Reliability Through Retail Rate Design:**
  - Artificial price caps and default plans harm efficiency and reliability
  - Revenue caps, not rate caps, for wires companies

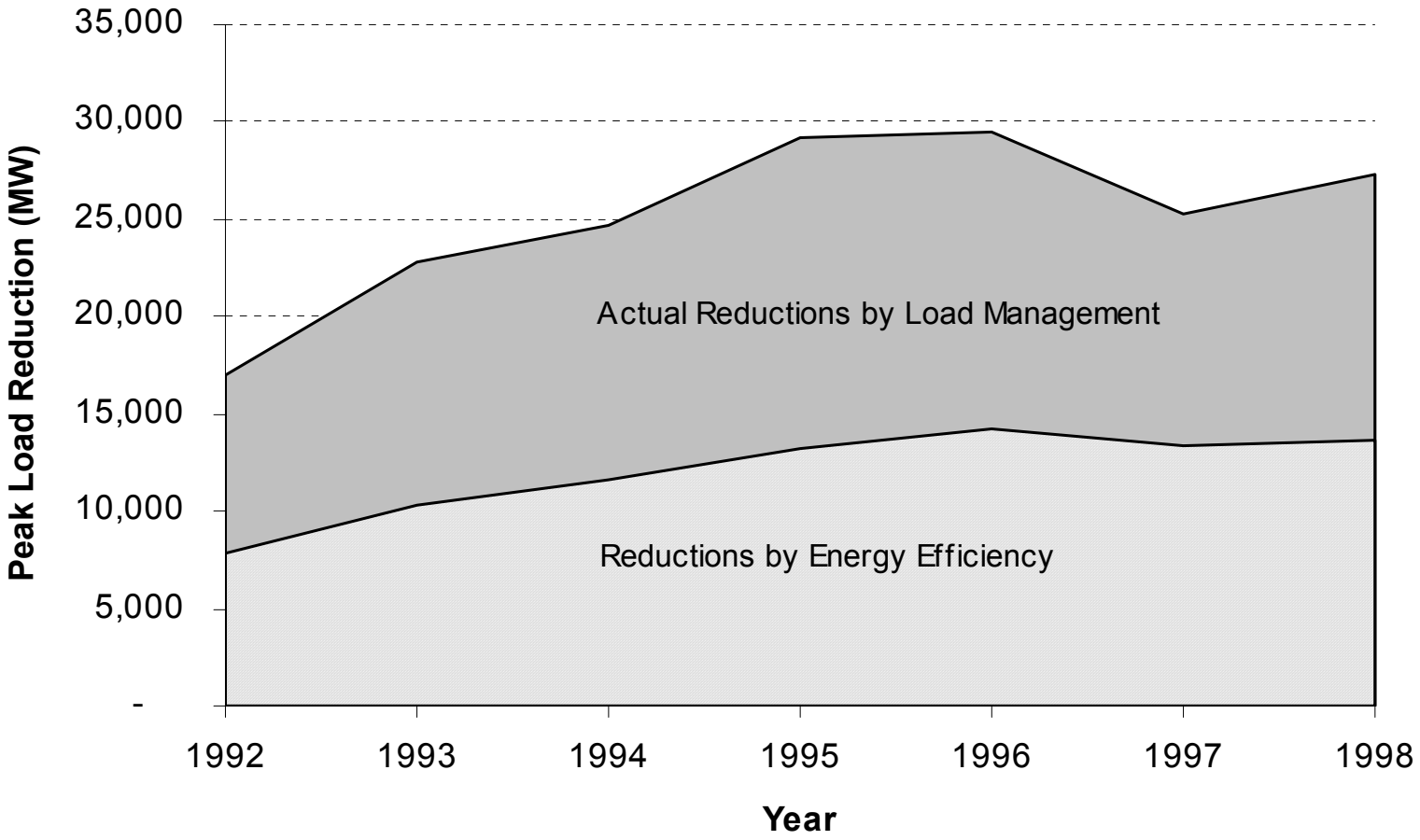
Solution Menu (C): Promoting End-Use Efficiency

- (7) System Benefit funds
  - Several examples: e.g.,NYSERDA
- (8) Energy Efficiency Utility and other regulated DSM programs
  - Key example: Vermont Efficiency Utility
  - Utility programs and standards- Texas 10%
- (9) Codes, standards, and market transformation programs
  - Regional uplift could enhance reliability, lower power costs

Old Lessons...Again

- Productivity and environmental quality
  -- still count
- Market failures
  --still real
- Peak response AND "baseload efficiency"
  -- both still needed
- Resource Portfolio Management
  -- IRP in a new light

DSM: Peak management AND Baseload Efficiency



Efficiency -- A Proven Resource

- Utility DSM programs delivered 29,000 MW savings at a grid cost of 2 to 3 cents per kwh
- Codes and standards have delivered more
- Modular, dispersed, many technologies
- Efficiency lowers customer bills, and lowers the price spikes for everyone
- Lowest in pollution
- Efficiency relieves stressed distribution, generation and transmission constraints
- Programs can be tailored for each market

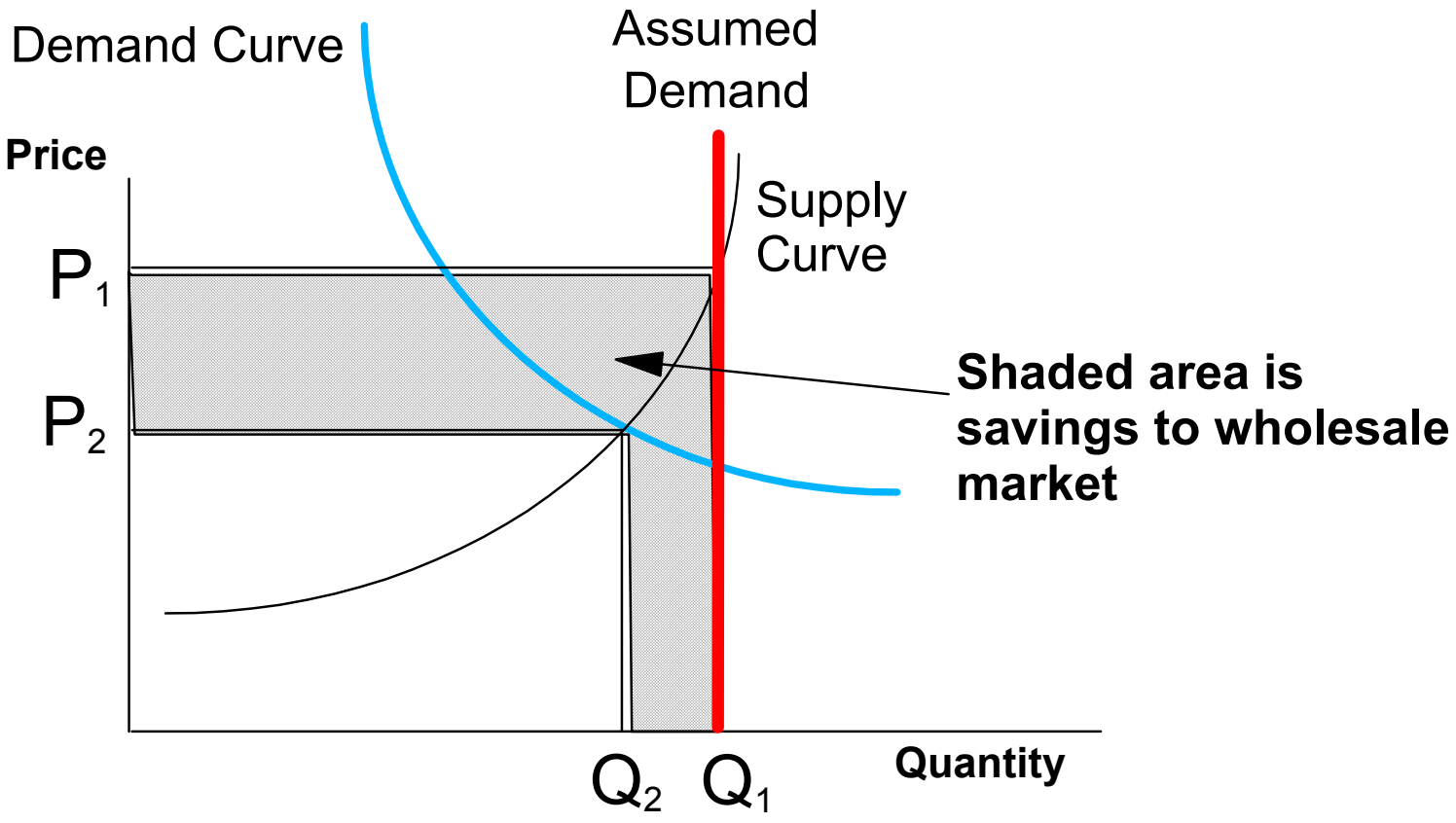
Who will promote efficiency in today's electric industry?

- Generators profit from high loads and thin markets
- Peakers REQUIRE high prices
- Franchises: getting lean for the future
- Wires companies with rate caps or freezes can be addicted to throughput
  - Lost profits math: a 5% increase in sales can increase profits by more than 50%!
- RTOs, Transcos, FERC: No tradition of support for efficiency

The Efficiency Reservoir

- **DOE "Five Labs" Study (1997):**
  - cost-effective DSM potential is 15% of total load by the end of this decade
- **Utility filings in current NJ docket --**
  - available, cost-effective savings potential is as much as 30% of total load
- **ACEEE studies, summer 2000:**
  - At least 64,000 MW available cost-effectively by 2010 from just three program areas:
  - Residential A/C upgrades, repairs
  - Commercial HVAC equipment and tuneups
  - Commercial lighting design and upgrades

The Public Value of Efficiency



The Public Value of Efficiency

- **Tracking CA PX Prices** ('98-'99)
- 1 MW baseload reduction saves participating customers $219,000
- AND it also saves non-participating customers $658,000 by lowering market clearing prices in the PX for everyone
- "Public savings" $.075/kwh, or three times the direct savings
  - (Rich Ferguson, CEERT 2000)

Uplift Charges

- Uplift charges are a common element in pool rules and new markets
- Examples: spreading out the costs of congestion; paying for reliability measures that have widespread value
- Question: If the new RTO/ISO/Pool has power to assess "uplift" for imports, reserves or transmission to enhance reliability, why not for efficiency, load management, or DG?

And finally...

- Two bags of savings:
  - Market efficiency and
  - Energy efficiency
- Why trade in one to get the other when we can get both?