Financing Projects with ICAP Revenues

Infocast Financing U.S. Power Conference

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LEVITAN & ASSOCIATES, INC.

Overview

- ❑ **Background**
  - ❖ Defining the problem / goals
  - ❖ NYISO, ISO-NE, & PJM basics
  - ❖ Common and divergent objectives / approaches
- ❑ **NYISO Mechanism**
  - ❖ Implemented June 2003
  - ❖ Assumptions / methodology / prices
- ❑ **ISO-NE Proposal**
  - ❖ Resolving design issues with FERC
  - ❖ Commencing Jan '06
- ❑ **PJM Proposal**
  - ❖ Ambitious and more complex
  - ❖ Timing uncertain
- ❑ **Future Issues**

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Background

- ❑ Problem
  - ❖ Low & volatile market capacity values
    - Capacity prices fall off "cliff" beyond minimum requirement
  - ❖ Generators in financial distress
    - Recovery of fixed plant costs through energy margin
  - ❖ Project financing model discredited
  - ❖ Long-run resource adequacy concerns
- ❑ Goals
  - ❖ Increase capacity values & reduce volatility
  - ❖ Provide price transparency to facilitate UCAP transactions
  - ❖ Recognize marginal benefit of generation above minimum level
  - ❖ Assure long-run resource adequacy

How are the three Northeast markets – NY, NE and PJM – trying to achieve these goals?

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Background

- New York
  - 38,521 MW to serve 31,800 MW of load
  - Load pockets in NYC & LI
  - Significant transmission cable potential

- New England
  - 31,752 MW for 25,735 MW of load
  - Expected 35% reserve margin will not materialize
  - Load pockets in SWCT and NEMA/Boston
  - Heavy dependence upon gas-fired generation

- PJM
  - 77,730 MW to serve 65,200 MW of load (Mid Atl & APS)
  - Deliverability requirement designed to avoid locational capacity needs
  - RTO expansion west (Com Ed, AEP, & DPL) increases size 70%
  - Probable RTO expansion south (DominionVP)

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Background – Common Objectives / Approaches

- LSEs required to satisfy ICAP requirement
  - Self-supply
  - Bilateral contracts
  - Auctions
- Provide sufficient UCAP revenues to assure cost recovery
  - Capital cost
  - Fixed operating expenses
- Avoid "cliff" problem of vertical demand curve
  - Prices rise to capped / deficiency level if market "tight"
  - Prices fall to near-zero when market is long
- Recognize locational needs
- ICAP calculated at equilibrium for "rational" investments

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Background – Divergent Objectives / Approaches

- ❑ Timing
  - ❖ Implemented (NYISO) and proposed (ISO-NE)
  - ❖ Under development (PJM) and in discussions (Cal ISO)
- ❑ Focus
  - ❖ Near-term (NYISO, ISO-NE)
  - ❖ Medium-term (PJM)
- ❑ Net energy & ancillary service revenues
  - ❖ Included (NYISO)
  - ❖ Excluded (ISO-NE)
- ❑ Marginal value of capacity above minimum
  - ❖ Steady (NYISO)
  - ❖ Segmented (ISO-NE, PJM)
- ❑ Operability goals
  - ❖ Incorporated (PJM)
  - ❖ Availability only (NYISO, ISO-NE)

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NYISO – History

- ❑ NY DPS introduced demand curve concept in 2002
  - ❖ Improve long-run resource adequacy by valuing additional ICAP
  - ❖ More stable and less volatile prices
- ❑ NYISO stakeholder process
  - ❖ 2003 and 2004 reference values
- ❑ FERC Approval May 2003
- ❑ Implemented June 2003
  - ❖ Replaced deficiency auction
- ❑ Three capacity auctions
  - ❖ Capability Period – six month (summer/winter) strips
  - ❖ Monthly – remaining months in period
  - ❖ Spot Market (deficiency auction) – demand curve mechanism

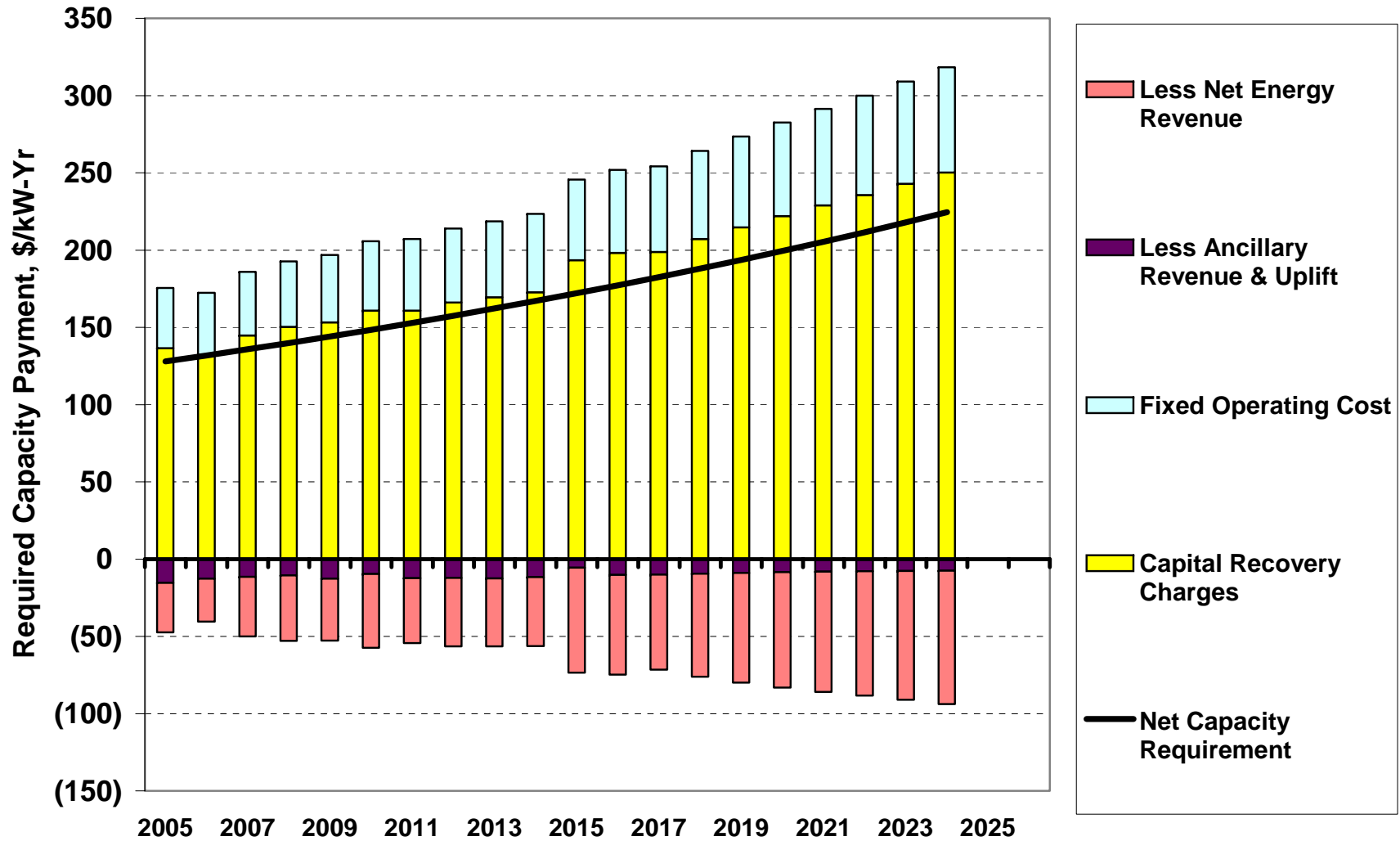LEVITAN & ASSOCIATES, INC.

NYISO – Demand Curve

- ❑ Gas Turbine Selection
  - ❖ NYC & LI – 2 x LM6000 w/ Sprint
    - 96.0 MW, 9,650 Btu/kWh
    - Substantial NYPA and LIPA data
  - ❖ ROS – 2 x 7FA
    - 336.5 MW, 10,600 Btu/kWh
    - *Limited* real-world data
  - ❖ Both gas-fired, with SCR and CO catalysts

- ❑ Forecast Net Revenues
  - ❖ Dispatch simulation with zones and surrounding markets
  - ❖ Summer and winter GT performance
  - ❖ Other key assumptions
    - Load forecast
    - Supply forecast
    - Fuel costs

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NYISO – GT Cash Flow Forecast

2005 Reference Plant Start Year -- New York City GT

Legend:
- **Less Net Energy Revenue**
- **Less Ancillary Revenue & Uplift**
- **Fixed Operating Cost**
- **Capital Recovery Charges**
- **Net Capacity Requirement**

Y-axis: Required Capacity Payment, $/kW-Yr

-9-

NYISO – Demand Curve

- ❑ Financing
  - ❖ Parent company on-balance sheet
  - ❖ Capital costs reflect _rational_ merchant project
  - ❖ Debt 50% @ 7.5% 20-year
  - ❖ Equity 50% @ 12.5% (after-tax)
- ❑ Levelization
  - ❖ 12.5% discount rate (after debt service)
  - ❖ First year (nominal dollars) = reference value
  - ❖ Escalation @ 3% in future years
- ❑ Demand Curve Structure

	Locational capacity req't	Zero crossing points
❖ NYC	80%	118%
❖ LI	95%	118%
❖ NYCA	118%	112%

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NYISO – Demand Curve

❑ Derivation of 2005 Reference Values

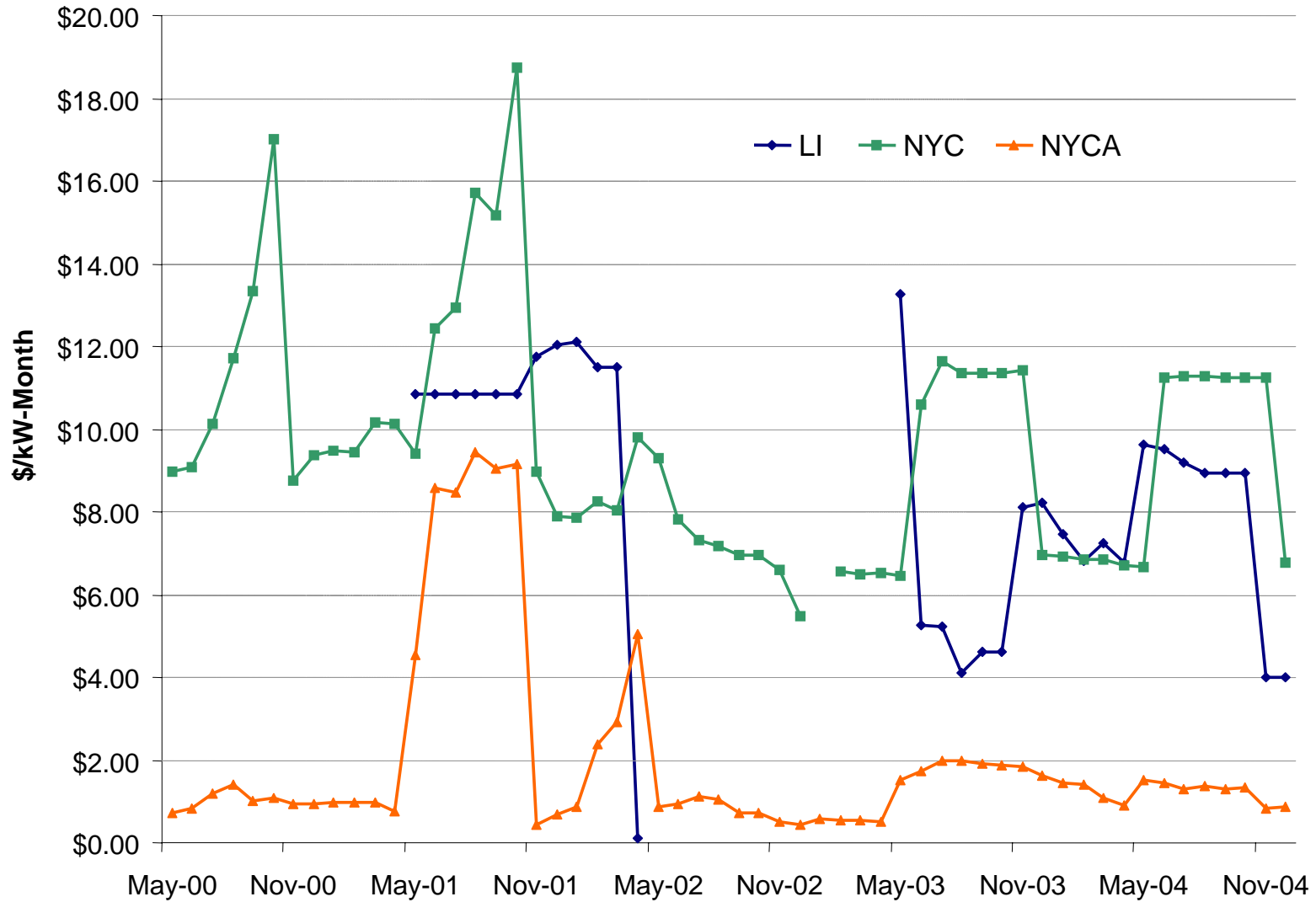|	NYC	LI	NYCA	
❖ Capital Costs	$114	$108	$201	millions
	$1,189	$1,126	$599	/kW
❖ Lev'd Cap Rev Req't	$176	$155	$ 87	/kW-yr
❖ Lev'd Net Revenues	$ 50	$ 40	$ 20	/kW-yr
❖ Net ICAP Req't	$126	$115	$ 67	/kW-yr
❖ Reference Points*	$13.70	$12.52	$ 6.78	/kW-mo

used in demand curves to meet net ICAP annual requirement

NYC and LI construction costs are high, and frame GTs in ROS offer significant economies of scale that lowers ICAP
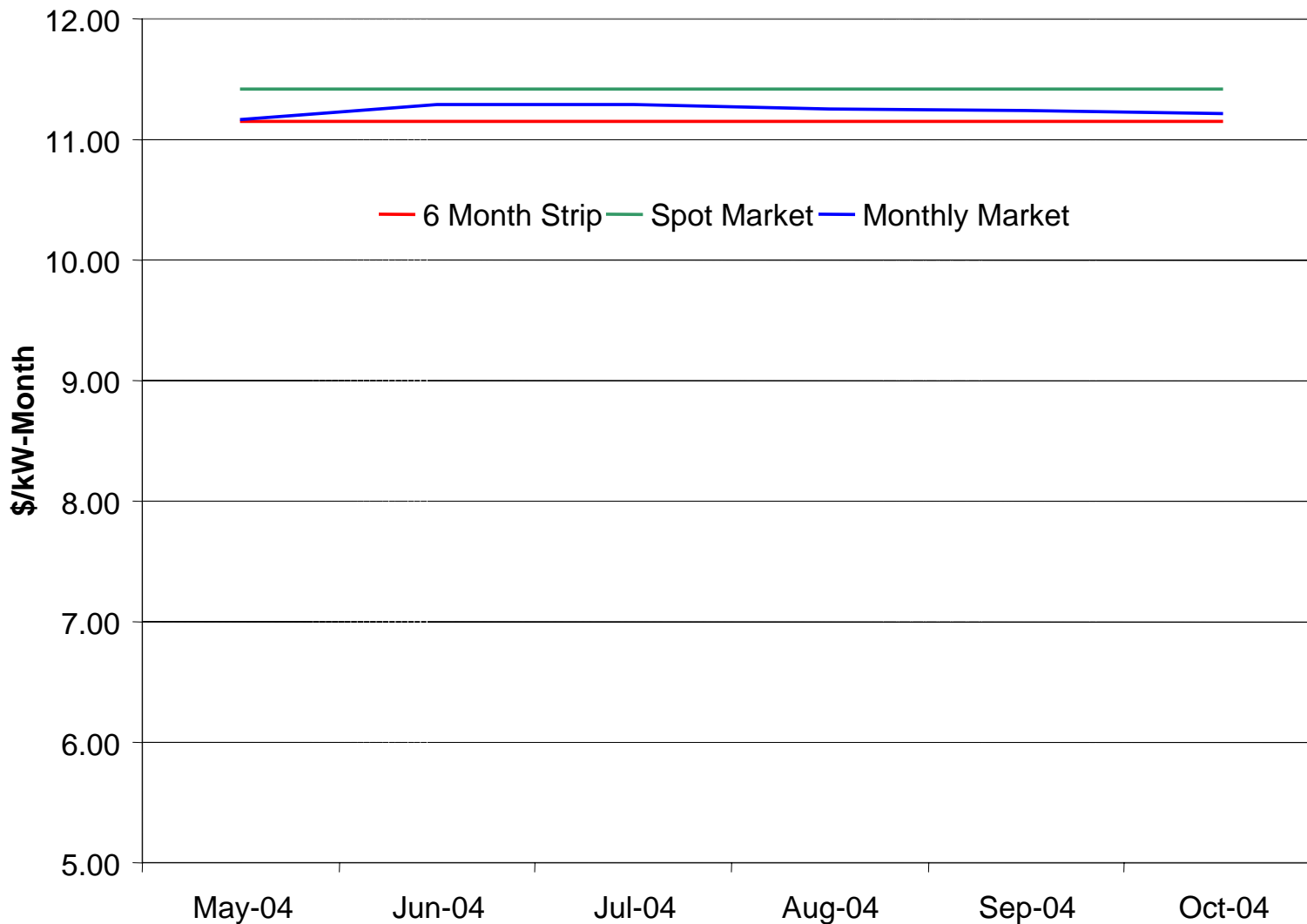
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NYISO – 2005 Capacity Rev. Requirements

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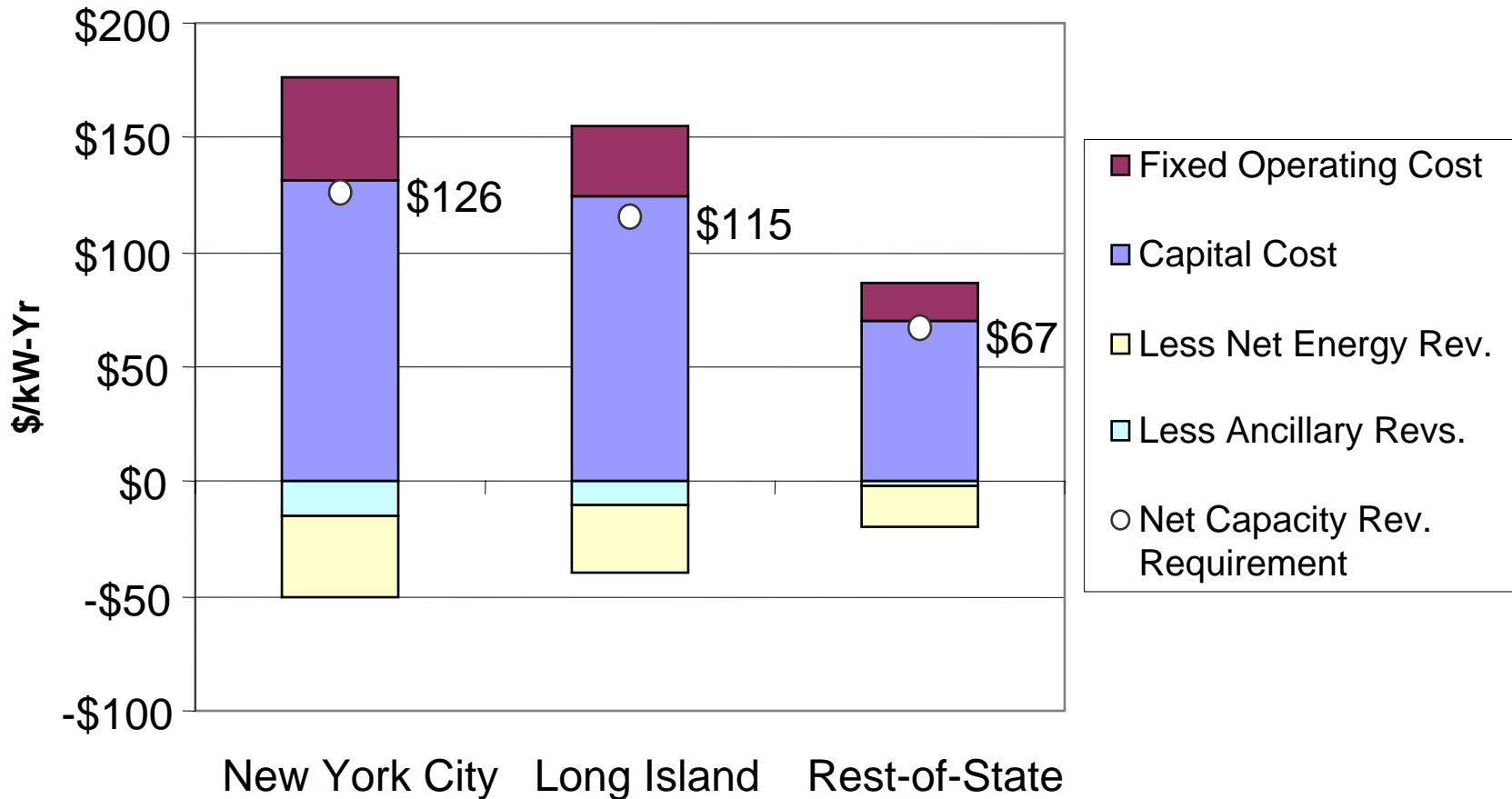
NYISO – Capacity Prices

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NYISO – NYC Auction Data

Price convergence among auctions is a good indicator

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NYISO – NYCA Auction Data

Price convergence among auctions is a good indicator

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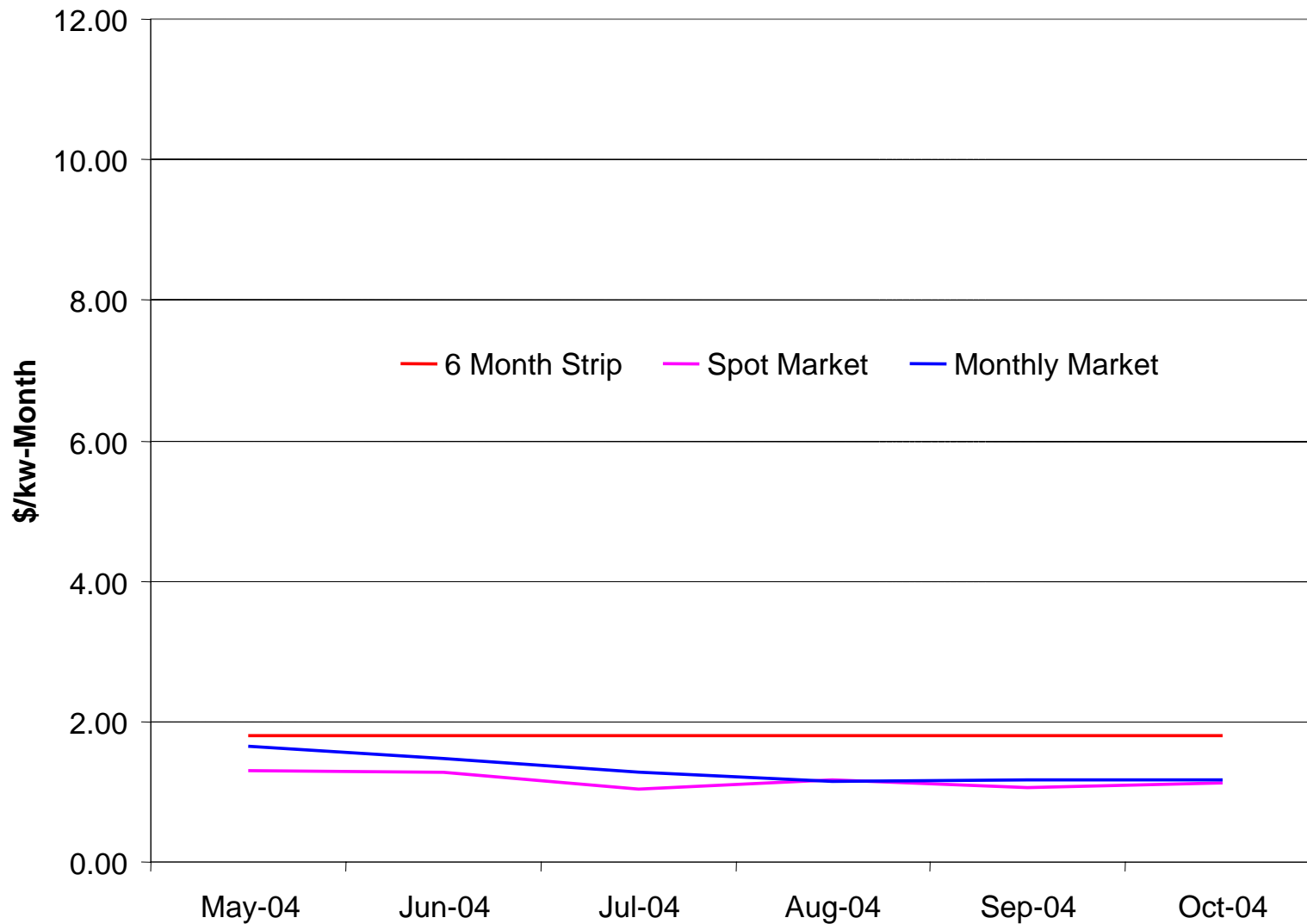
ISO-NE

- ❑ Generators in trouble
    - ❖ NRG – Devon, Middletown, Montville, Norwalk
    - ❖ PPL – Wallingford
    - ❖ Expected 35% reserve margin will <u>not</u> materialize

- ❑ Regulatory History
    - ❖ FERC approved SMD Sept '02
    - ❖ NRG filing for RMR Feb '03
    - ❖ Market-wide ICAP (with SMD) Mar '03
    - ❖ Apr '03 Order replaced RMR with PUSH mechanism
    - ❖ Required locational ICAP mechanism by June '04

ISO-NE is following in NYISO's footsteps

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ISO-NE Installed Capacity Prices

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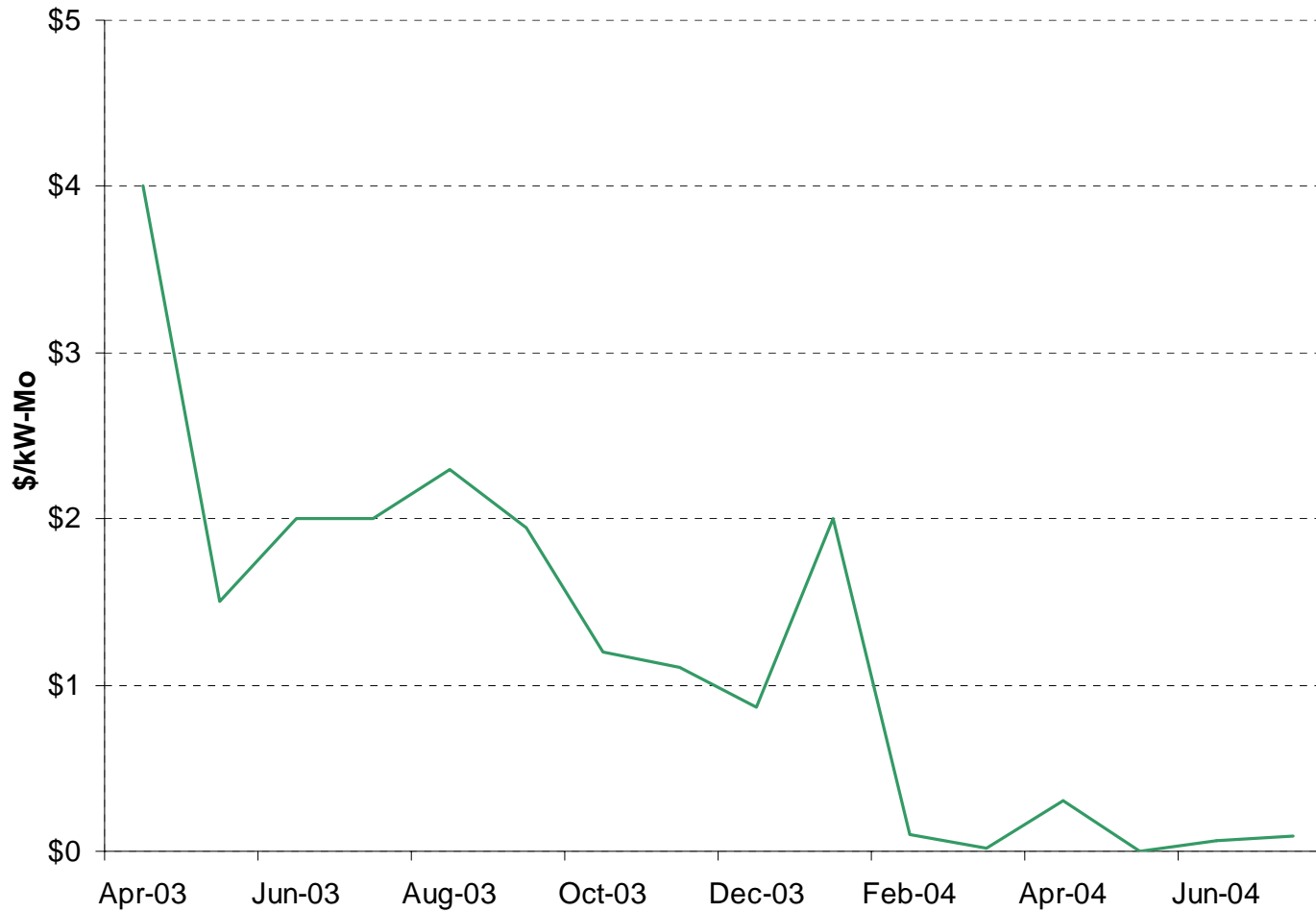
ISO-NE

❑ ISO-NE Proposal Mar '04

   ❖ Four capacity regions – ME, CT, NEMA/Bos, and Rest-of-Pool

   ❖ June '04 implementation with 5 year phase-in period

   ❖ Downward-sloping demand curve

   ❖ Transition payments to peakers in constrained locations

❑ FERC Response June '04

   ❖ *You win some*

      • Locational ICAP

      • Downward-sloping demand curve

   ❖ *You lose some*

      • SWCT zone

      • Demand curve parameters

      • Delay until Jan '06 w/o transition period

      • Inter-regional capacity transfer limits (CTL)
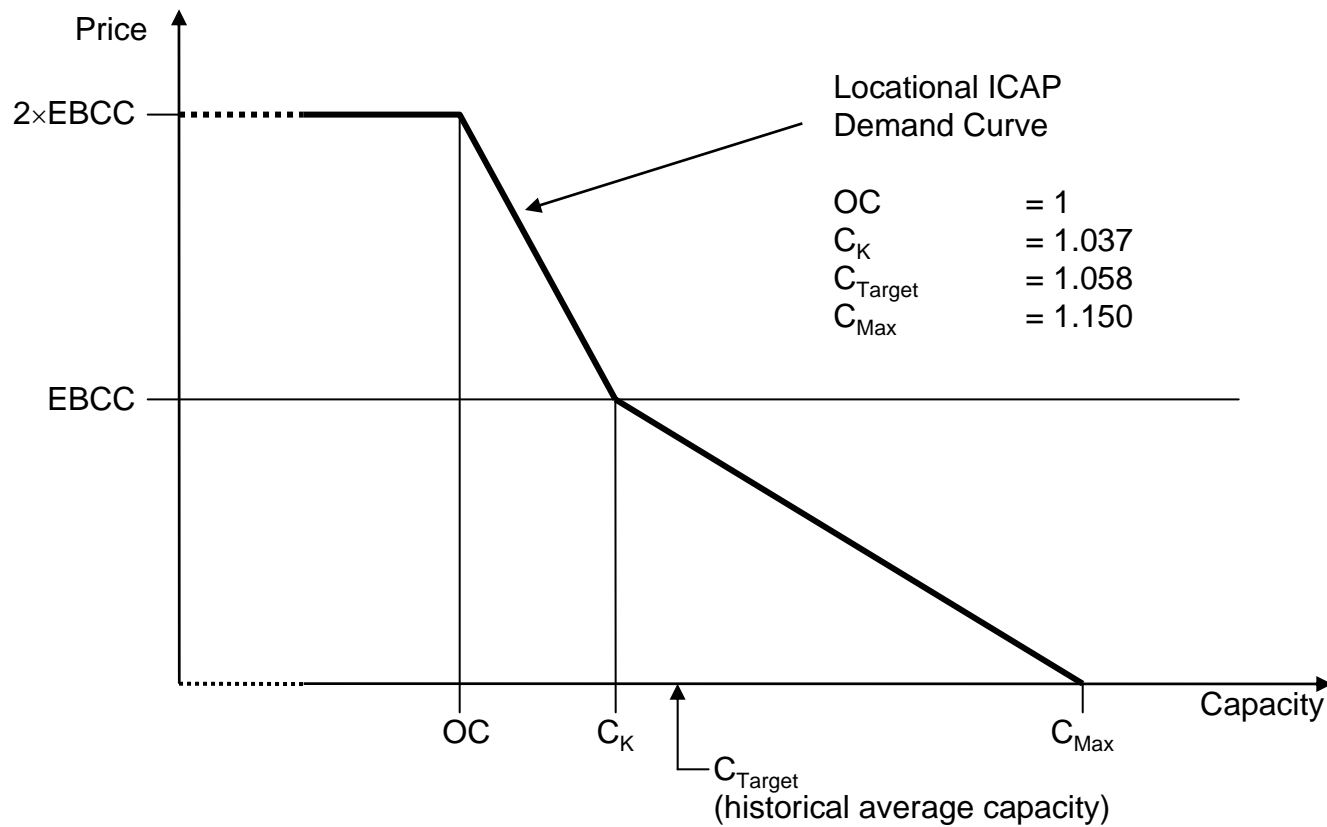
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ISO-NE

- ❑ **ISO-NE July/Aug '04 Filing**
  - ❖ EBCC is a single industrial frame GT
  - ❖ Recognized SWCT zone
  - ❖ Dual-fuel capable with SCR
  - ❖ 50% debt @ 7%, 50% equity @ 12%, 20 yrs

- ❑ **Proposed costs and demand curve parameters**

	NEMA	SWCT	R-CT	Maine	Rest-of-Pool	
Cap Costs	$105	$105	$102	$95	$97	million
	$620	$616	$602	$560	$571	/kW
Lev'd Req't	$97.87	$99.16	$96.52	$87.22	$92.34	/kW-yr
Demand curve	$8.16	$8.26	$8.04	$7.27	$7.70	/kW-mo

ISO-NE demand curve values may be above NYCA ($67) value without summer / winter DMNC adjustments

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ISO-NE – Proposed Demand Curve

Price

2×EBCC

Locational ICAP
Demand Curve

OC = 1
C_K = 1.037
C_{Target} = 1.058
C_{Max} = 1.150

EBCC

Capacity

OC C_K C_{Max}

C_{Target}
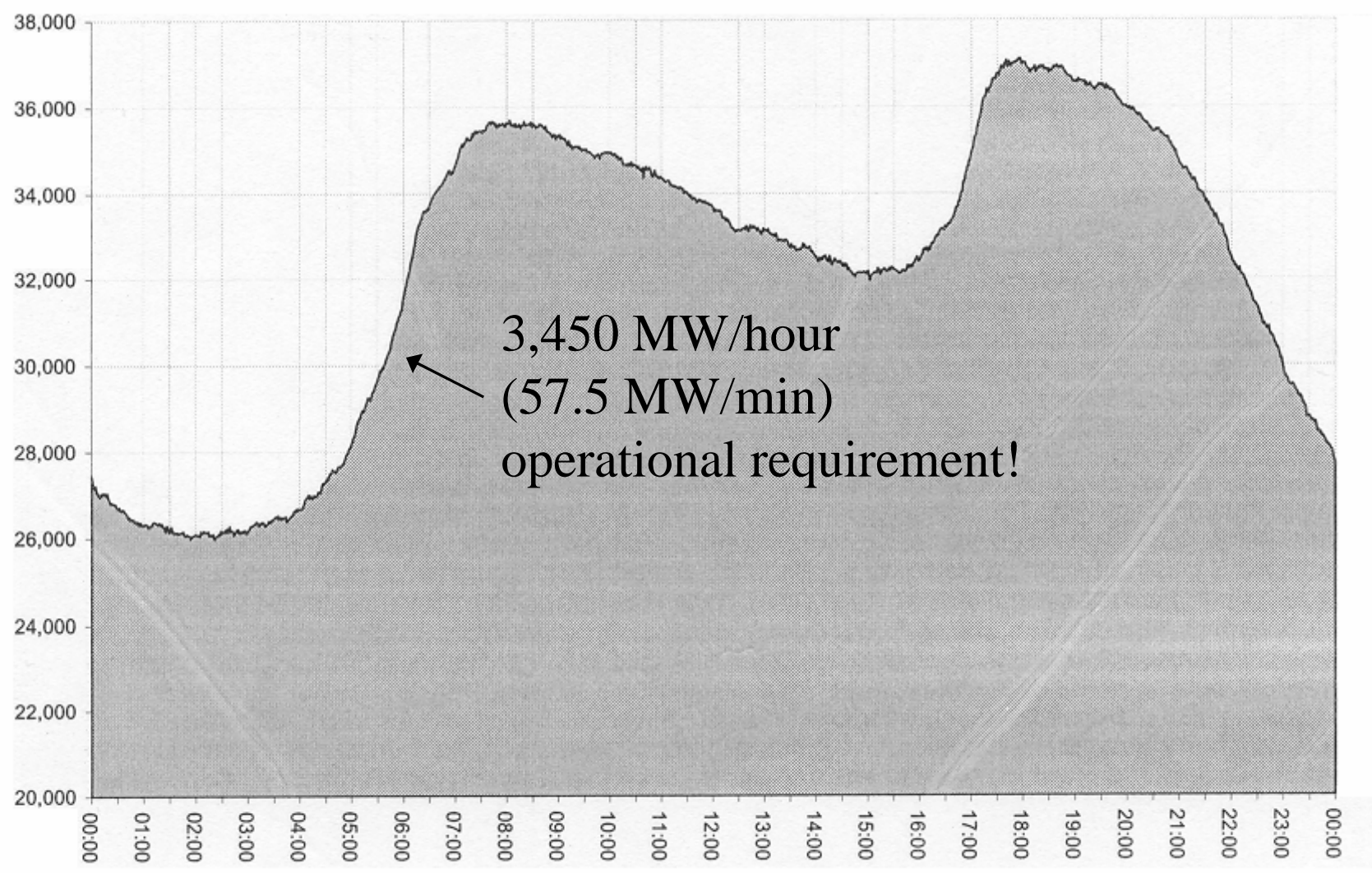(historical average capacity)

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PJM – Existing System
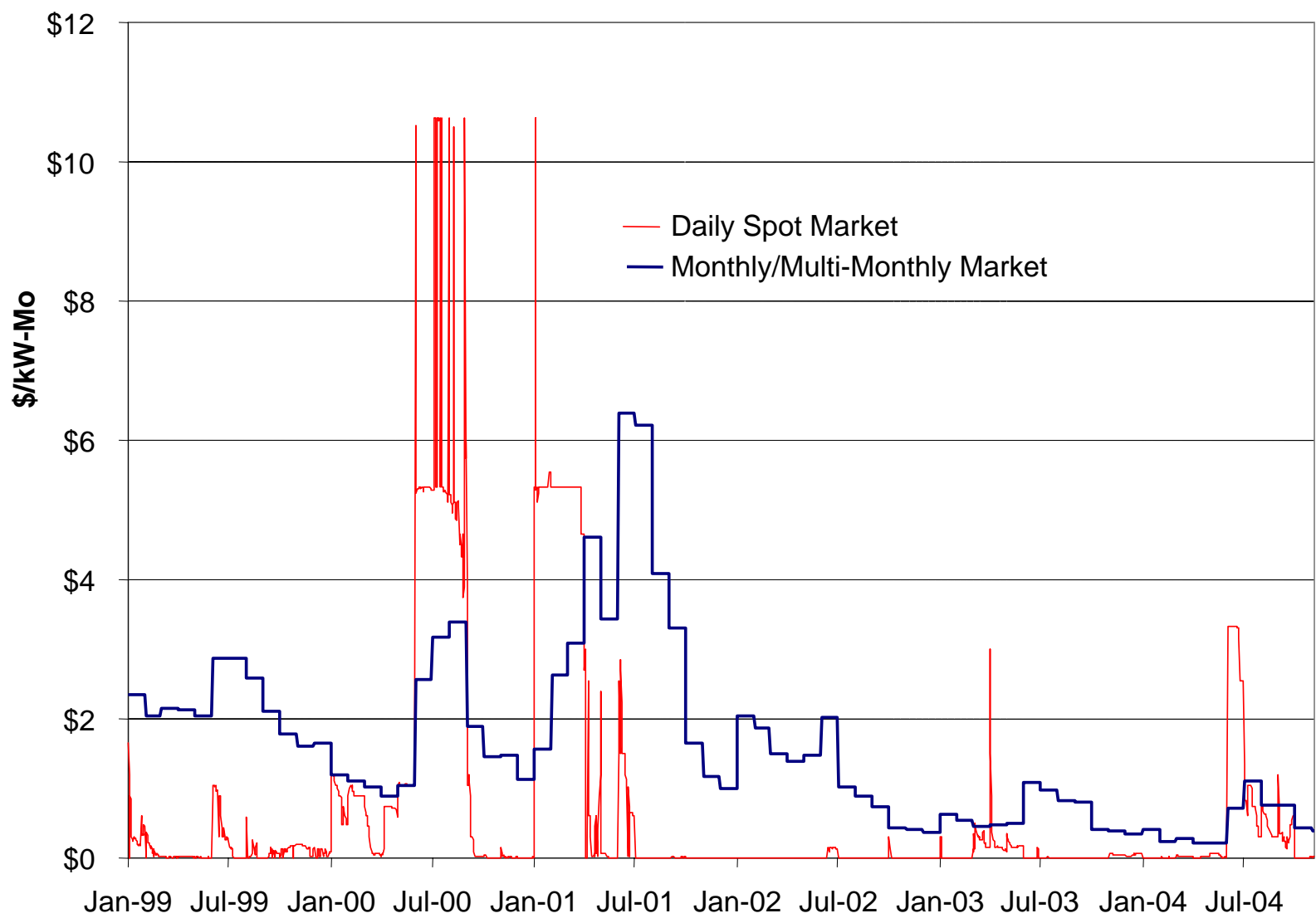
- Universal deliverability implies single capacity market

- Monthly and daily capacity auctions
    - Uniform clearing price across market
    - Rigid reserve criterion creates vertical demand requirement
    - Volatile prices led to market power and RAM / RPM discussions

- New Concerns
    - Risk of insufficient unit diversity to maintain reliability
    - Increased gas-fired capacity – infrastructure concerns, price volatility
    - Declining load-following capability offered
    - Fewer units offering start/stop flexibility
    - Increasing need for 30 minute response

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PJM – Typical Winter Load

3,450 MW/hour
(57.5 MW/min)
operational requirement!

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Source: PJM

-22-

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PJM – Unforced Capacity Prices

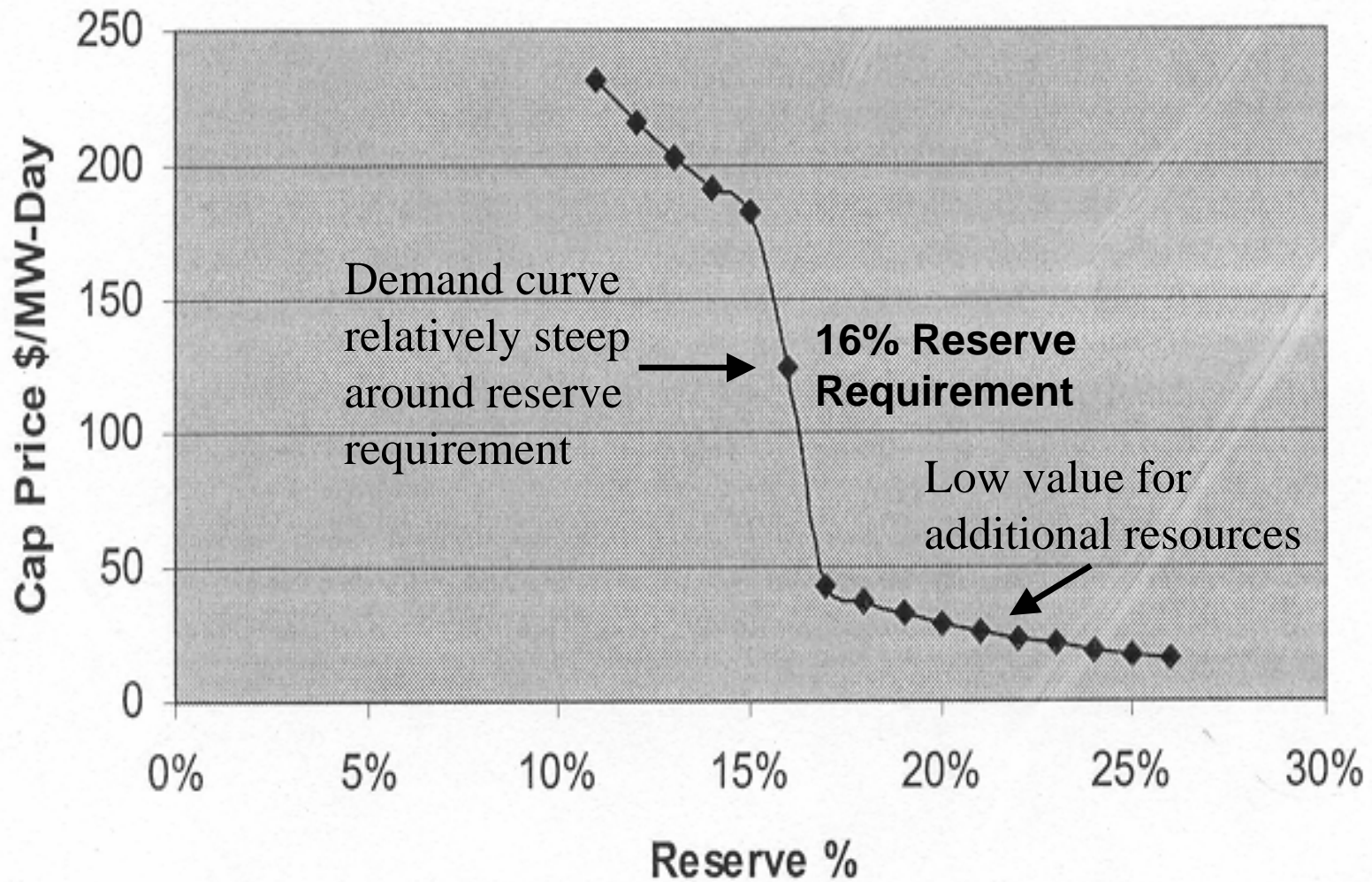LEVITAN & ASSOCIATES, INC.

PJM – Reliability Pricing Model

❑ Designed to promote overall system reliability

❑ Resource-specific to provide efficiency incentives

  ❖ Locational demand curves

  ❖ Product differentiated by location, type, and operational characteristics

❑ Deficiency charge = 2 x capacity clearing price

  ❖ Failure to deliver

  ❖ Increased forced outage rate

❑ Annual capacity auctions

  ❖ Longer-term pricing signals to encourage bilateral contracts, investment

  ❖ Load-following (ramp rate and start/stop) resource constraint

  ❖ Supplemental reserves (30-minute) constraint

  ❖ Clearing prices by optimization algorithm

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PJM – RPM Auction Timing

Source: PJM

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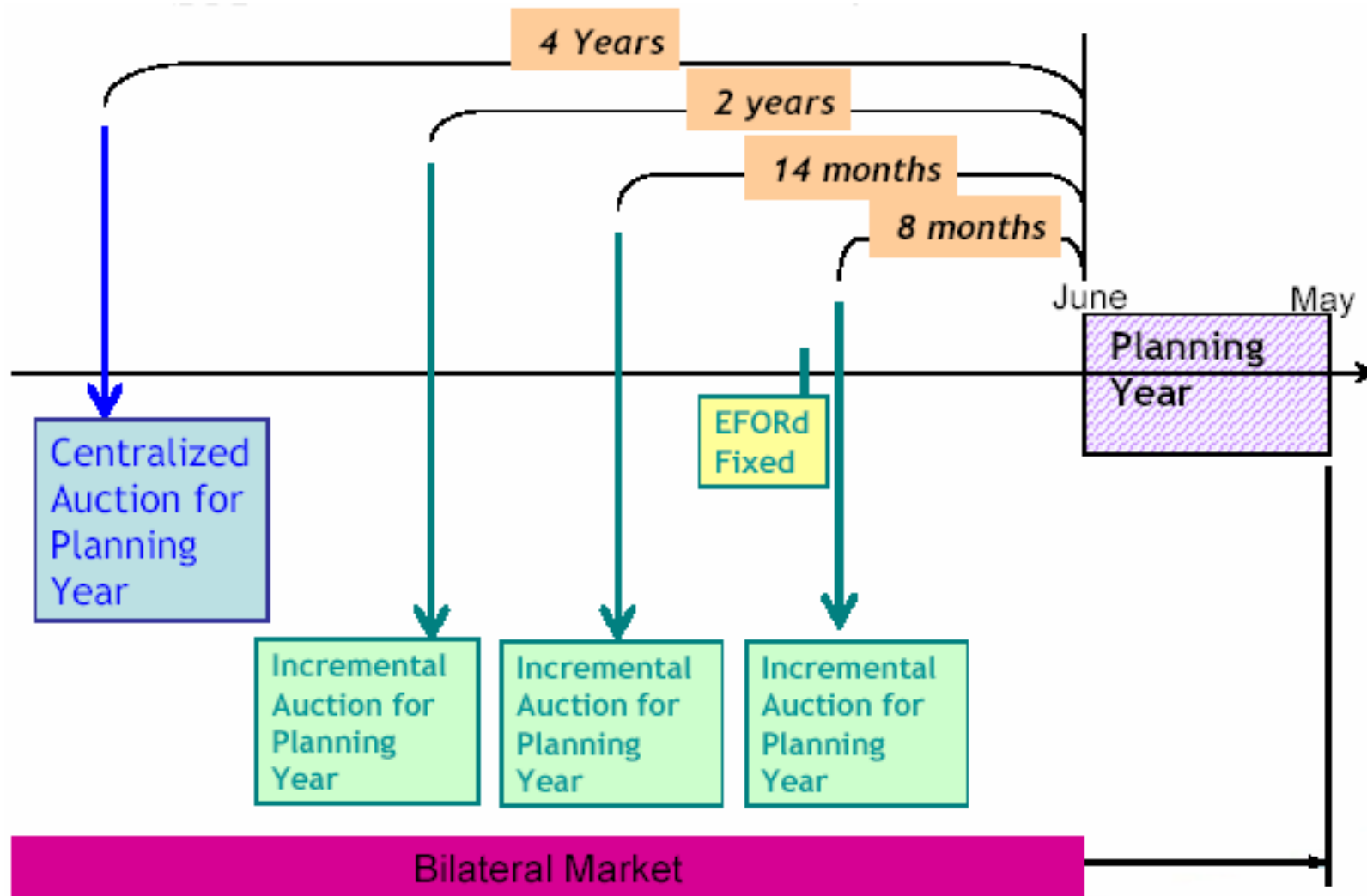
PJM – Sample Demand Curve

Source: PJM

-26-

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PJM – Reference Values

❑ Key assumptions

  ❖ Dual-fuel aero and frame GTs with SCR

  ❖ 50% debt @ 7.0% 20 yr / 50% equity @ 12%

  ❖ Fixed O&M costs included

❑ Costs and demand curve parameters

	2xLM6000	2x7FA	
Cap Costs	$79.6	$156.5	million (2004)
	$817	$447	/kW
Lev'd Req't	$125.71	$66.64	/kW-yr (2006)
Dem Curve	$344.40	$182.58	/MW-day

Proposed PJM demand curve values are remarkably close to NYISO values

-27-

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Future ICAP Issues

- ❑ **NYISO**
  - ❖ LIPA contracts (KeySpan, etc) makes market "thin"
  - ❖ Neptune cable project would affect LI locational ICAP / supply
  - ❖ NYC challenges – SCS Astoria PPA, NYPA RFP
- ❑ **ISO-NE**
  - ❖ CTL values will affect LBMPs
  - ❖ Transmission projects in SWCT and NEMA/Boston
- ❑ **PJM**
  - ❖ RPM is ambitious and different than NYISO / ISO-NE
  - ❖ RPM addresses unidentified load pockets
  - ❖ Timing and final design uncertain

True test of ICAP mechanism will be the "right" generator entry in the desired locations

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