Putting Competitive Power Markets to the Test

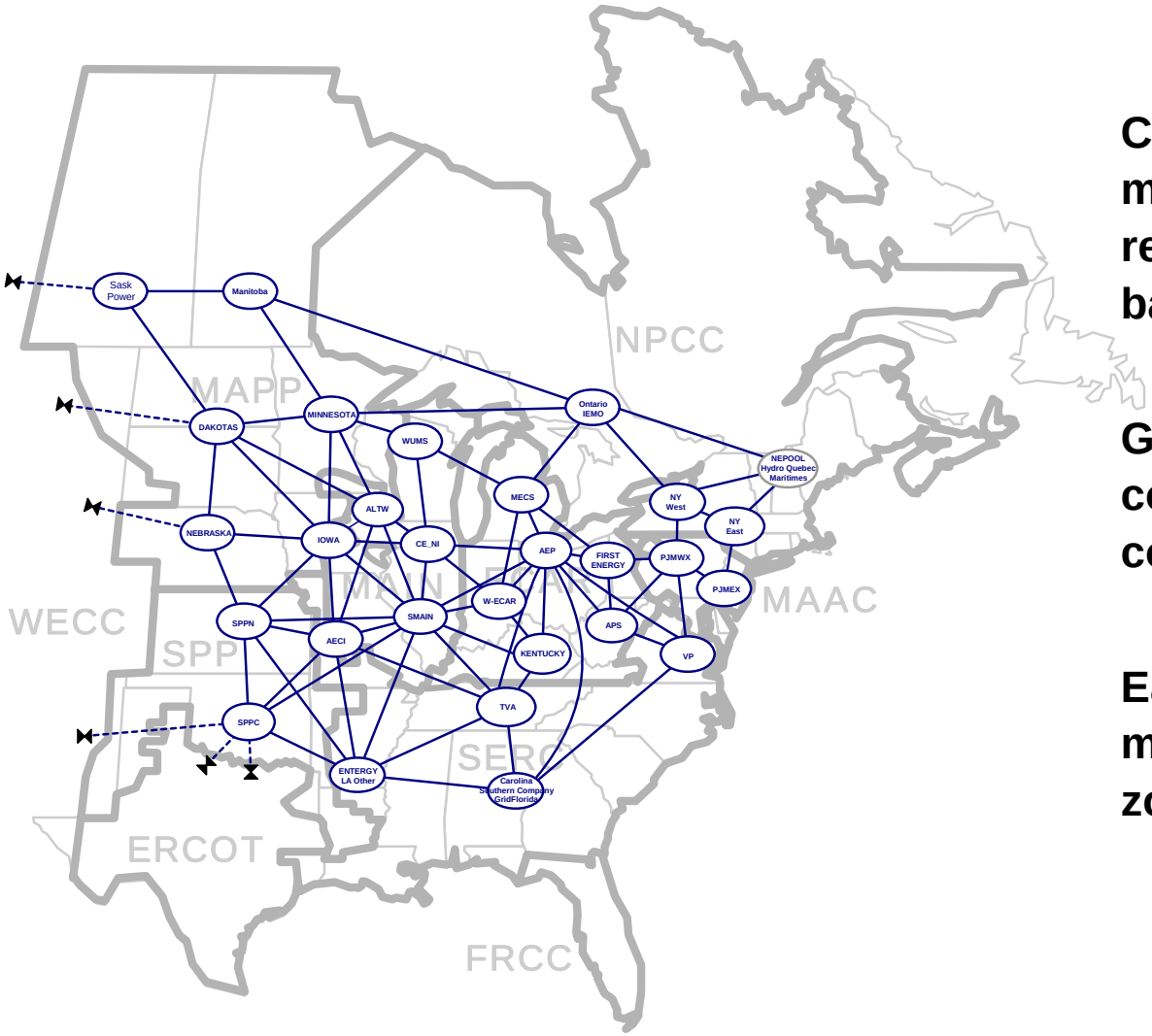
The Benefits of Competition in America's Electric Grid: Cost Savings and Operating Efficiencies

Released JULY 2005

Gary L. Hunt, President, Global Energy Advisors

Global Energy Decisions

Quantify Consumers Benefits from Wholesale Competition in the Eastern Interconnection 1999-2003



Compare actual competitive market results with expected results under traditional rate-base regulated market.

Global Energy simulated pre-competitive market conditions.

Eastern Interconnect modeled across 29 market zones

Global Energy's approach to the Study

1. Global Energy assessed the Eastern Interconnection wholesale electric power markets as they occurred in the 1999-2003 study period ("With Wholesale Competition" Case) comparing those results to a simulated study case which excluded the regulatory changes, tariff protocols and market rules that enabled wholesale competition ("Without Wholesale Competition" Case).

2. The Study used the *Global Energy Reference Case*, a widely accepted independent analysis of power market fundamentals.

3. Simulations were performed using Global Energy's *STRATEGIC PLANNING* software (formerly called Midas Gold Analyst)

4. Results in the PJM case study were derived from replicating the findings of the PJM Market Monitor.

5. Full Study results can be downloaded at www.globalenergy.com

Two Study Cases: Regulated and Competitive

Regulated:
Without Wholesale Competition

Operating Expenses

Fuel

+ Variable O&M

+ Fixed O&M

+ Depreciation

+ Property Taxes

+ Income Taxes

New Generation Built by Regulated Sector

+ Operating Income

Competitive:
With Wholesale Competition

Operating Expenses

Fuel

+ Variable O&M

+ Energy Purchases

+ Capacity Purchases

Competitive Sector Revenues

How Two Study Cases Differ

Competitive Plants

- Without Wholesale Competition case: no merchant plants would be built but qualifying facilities built under PURPA were included.

Regional Transmission Organization (RTO)

- Without Wholesale Competition case assumed FERC Orders 888 and 2000 never occurred and that RTOs were not formed, and
- RTO transmission rates are replaced with pancaked transmission rates, which traditionally existed in these areas.

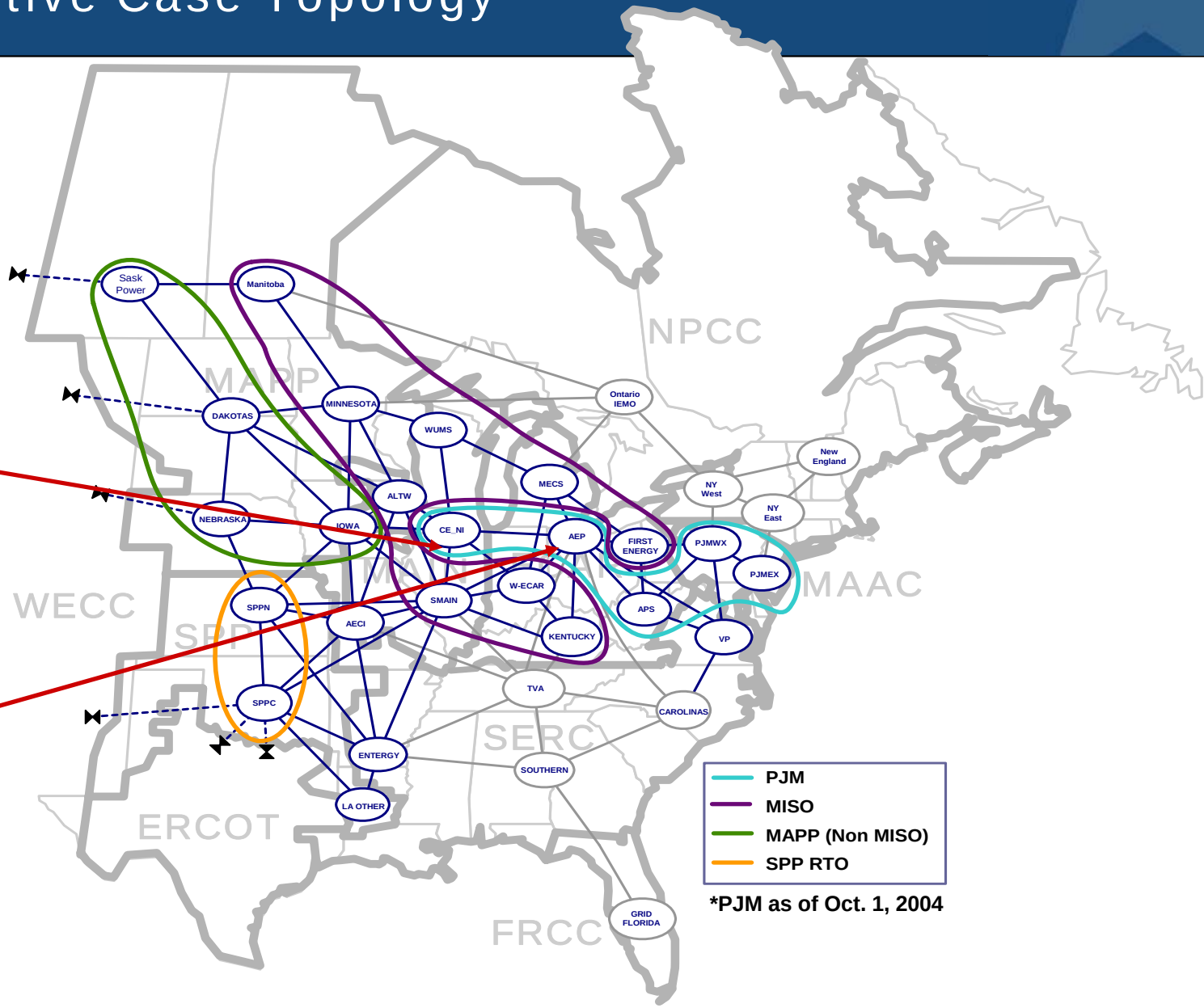
Market-Based Rates for Wholesale Energy

- Without Wholesale Competition case assumed marginal cost-based contracts replace market-based wholesale energy.

Global Energy's Market Analysis Competitive Case Topology*

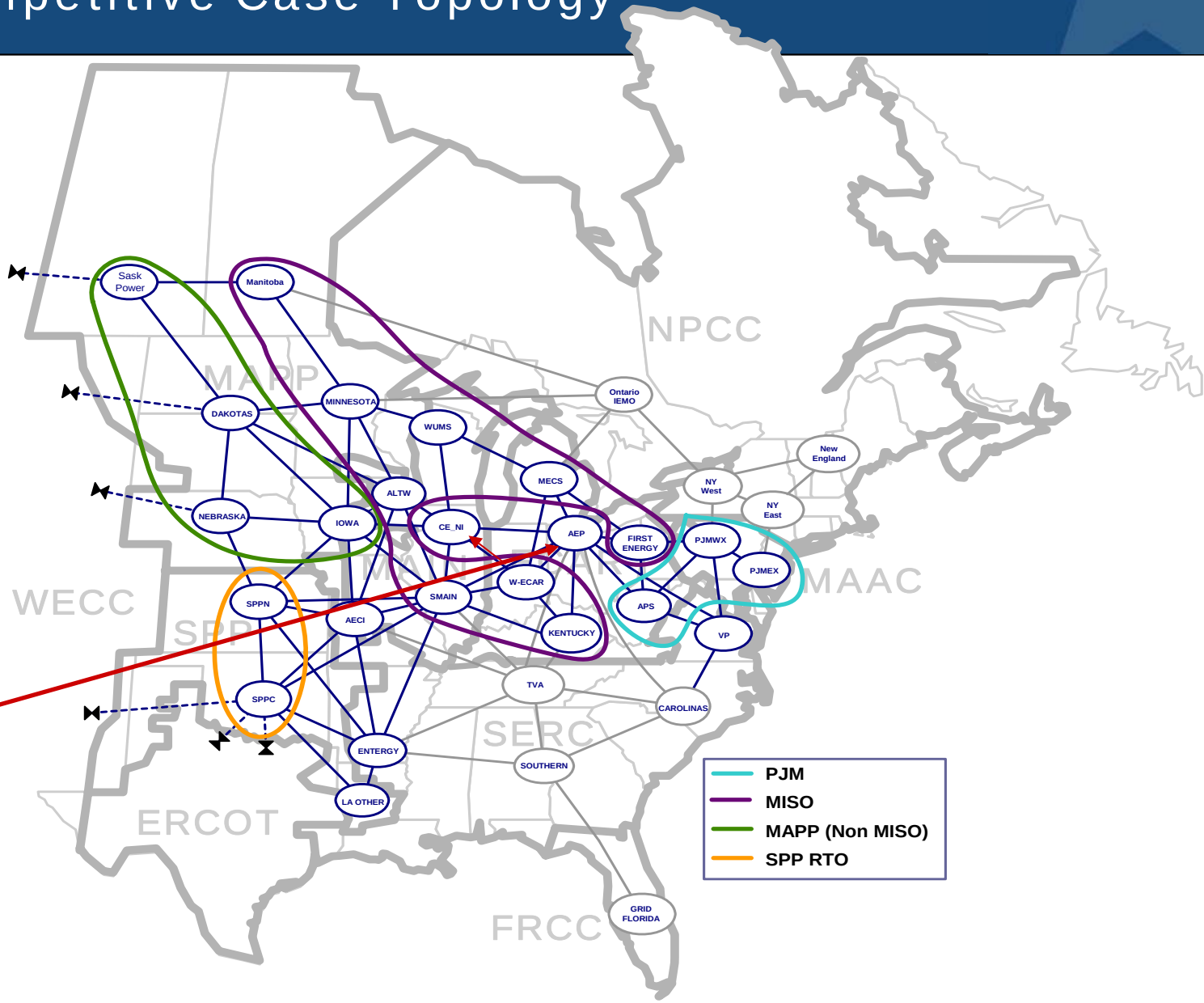
ComEd integrated on May 1, 2004

AEP/DPL integrated on Oct. 1, 2004



*PJM as of Oct. 1, 2004

Global Energy's Market Analysis
Non-Competitive Case Topology

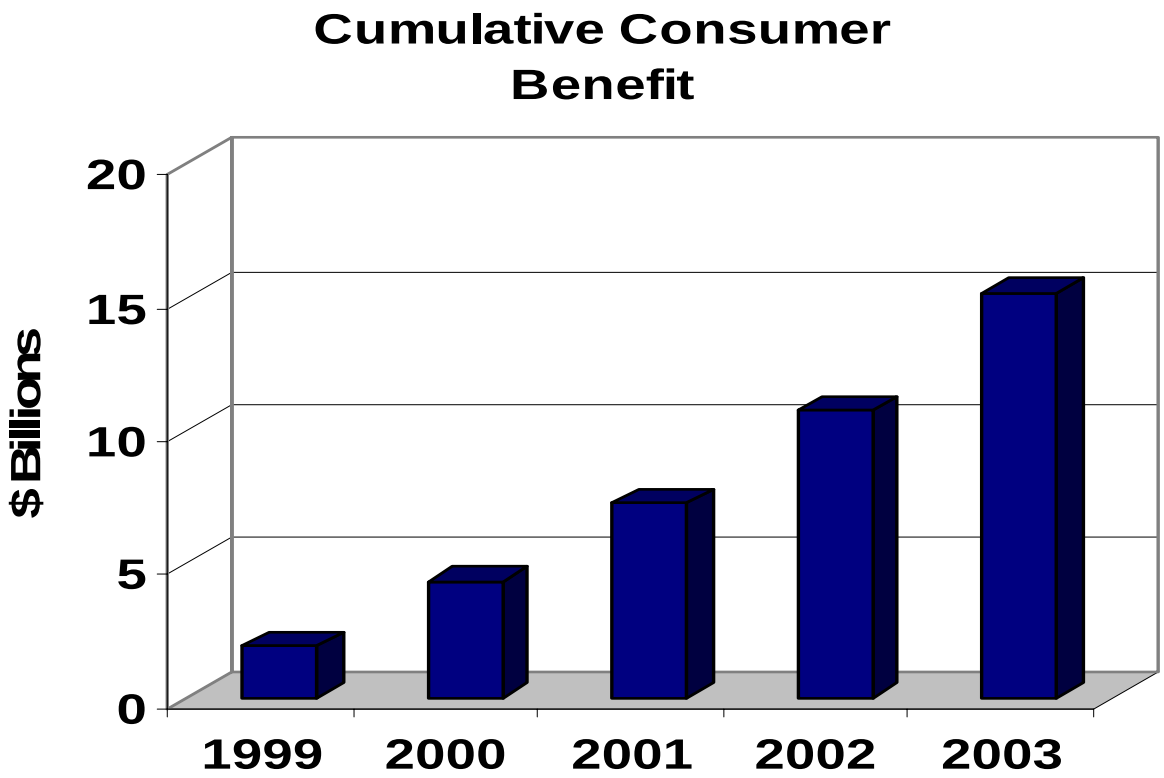


ComEd, AEP, DPL modeled outside of PJM

Study Findings at a Glance

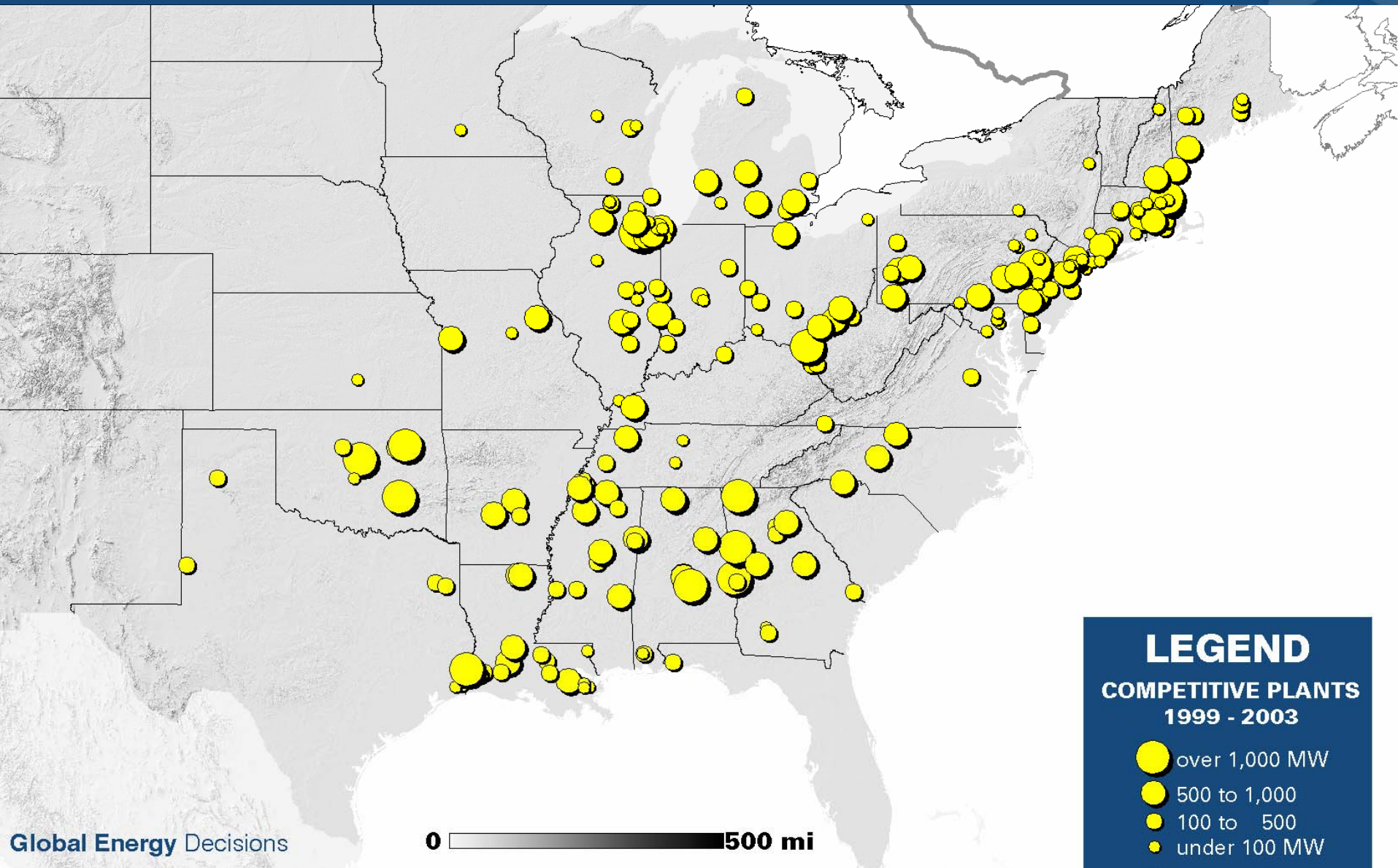
Consumer Value from Competition	Consumers realized $15.1 billion in annual savings in 1999-2003 study period from competitive forces
Energy Efficiency Gains	Nuclear plant efficiency gains enough to supply energy required for 10 million homes for one year.
	Coal plant efficiency gains enough to supply 25 million homes for one year
Opening PJM to competition from Midwest power plants	$84.5 million in annualized savings from wholesale price reductions and lower transmission costs.

Consumers realized $15.1 billion in value from wholesale electric competition

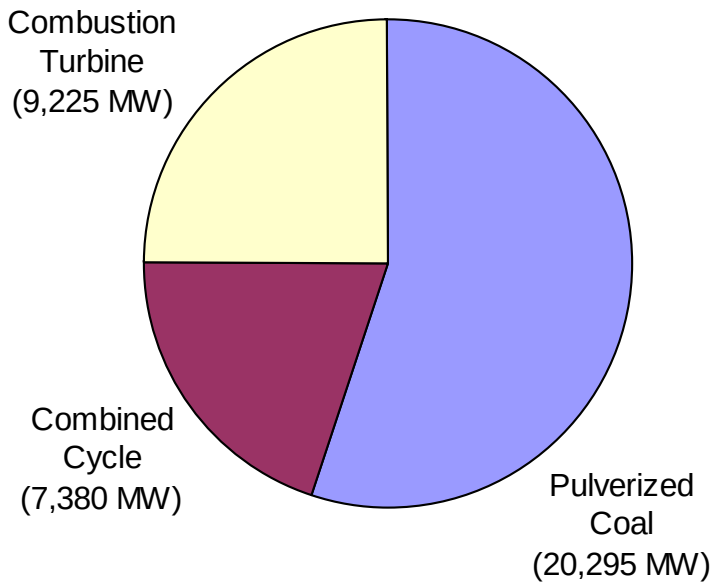


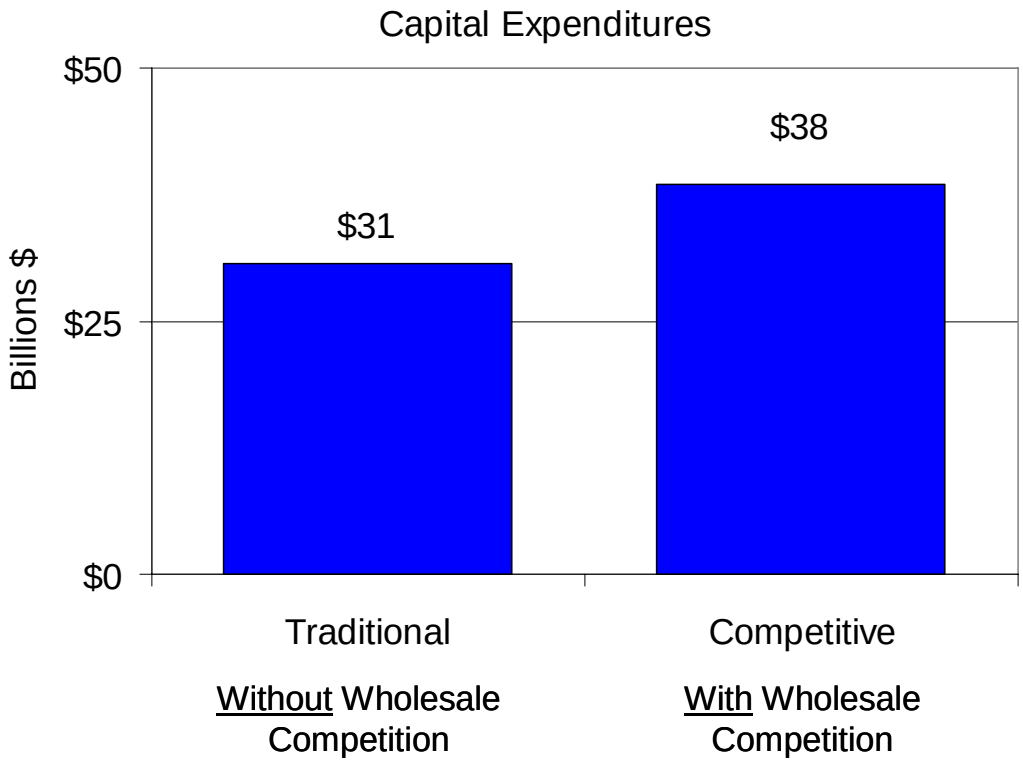
Global Energy Decisions

88,686 MW Competitive Plant Additions 1999-2003



Without Competition: More coal and higher O&M





Electricity Consumer Benefit

	With Wholesale Competition	Without Wholesale Competition	Consumer Benefit
Fuel (Fossil and Nuclear)	156,971	160,979	(4,008)
+ Variable O&M	19,515	21,902	(2,387)
+ Competitive Energy Purchase	11,495	-	11,495
+ Competitive Capacity Value	2,220	-	2,220
+ Fixed O&M	-	7,610	(7,610)
+ Depreciation	-	2,670	(2,670)
+ Property Taxes	-	931	(931)
+ Income Taxes	-	3,289	(3,289)
+ Operating Income	-	7,960	(7,960)
Operating Expenses (millions $)	**190,200**	**205,342**	**(15,141)**

Wholesale Competition Dramatically Improved Efficiency of Power Plants

10,000,000 homes served by nuclear efficiency gains

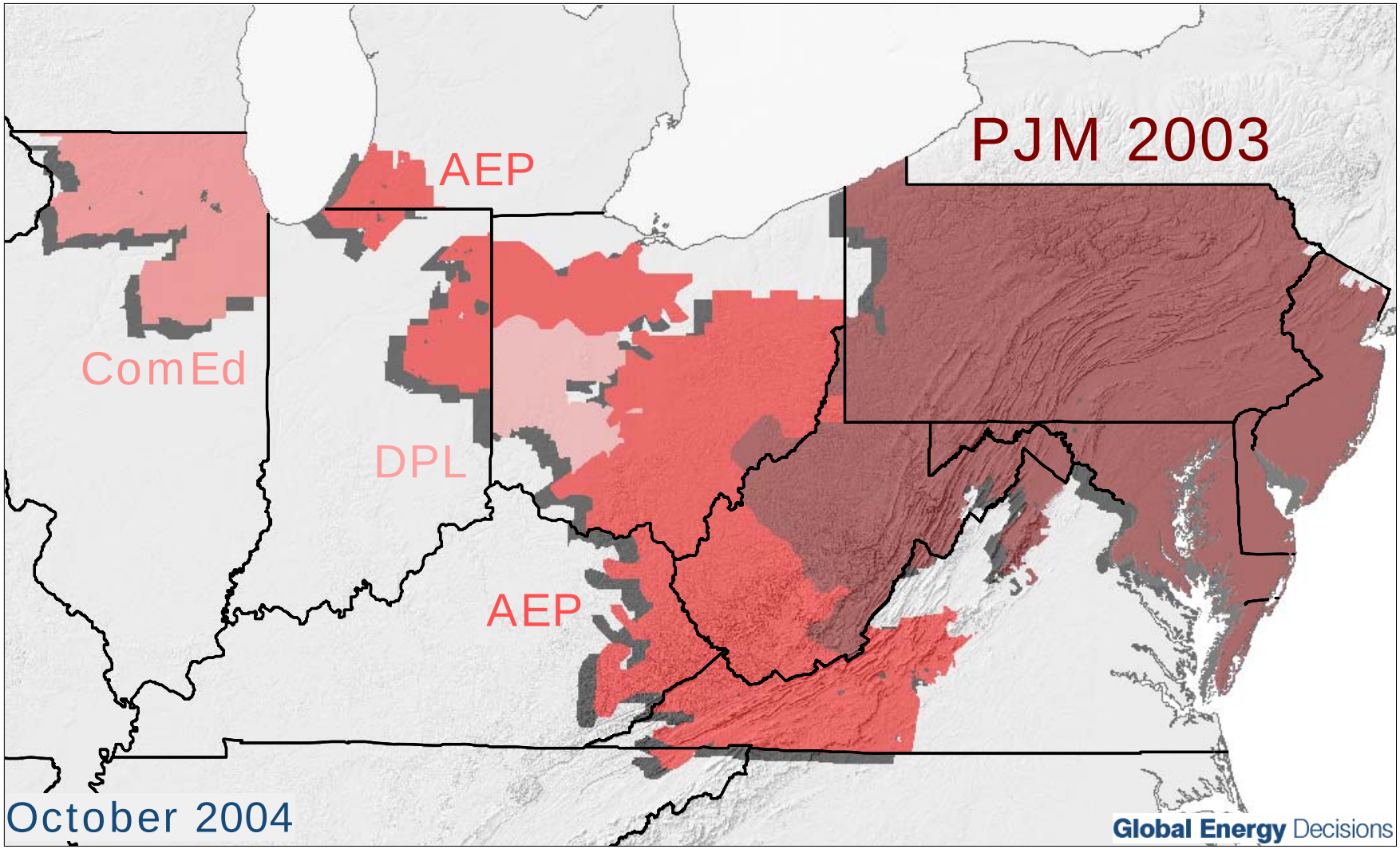
- 13% savings in nuclear plant refueling time since 1999
- 8% lower nuclear O&M costs
- 17% improved nuclear plant capacity factors1995-2004

25,000,000 homes served by coal plant efficiency gains

- 4% gains in coal plants heat rates since 1999.
- 14% lower coal plant O&M costs
- 16% improved coal plant capacity factors 1995-2004

Global Energy Decisions

Case Study: PJM Market Opening Impacts



Expanding PJM in 2004 produced $85.4 million in annualized cost savings from competition

Global Energy compared integration of ComEd, AEP and DPL into PJM with a simulated 2004 market case in which they did not join PJM.

Finding: 4.2 percent decline in load-weighted spot market power prices in PJM confirming PJM Market Monitor report

Finding: Expanding PJM in 2004 produced $85.4 million in annualized cost savings from competition

PJM Case Study Summary

In 2004, ComEd, AEP and DPL joined the PJM, resulting in:

- Increased access between all markets in the eastern interconnect
- RTO-wide management of transmission and reserve markets.

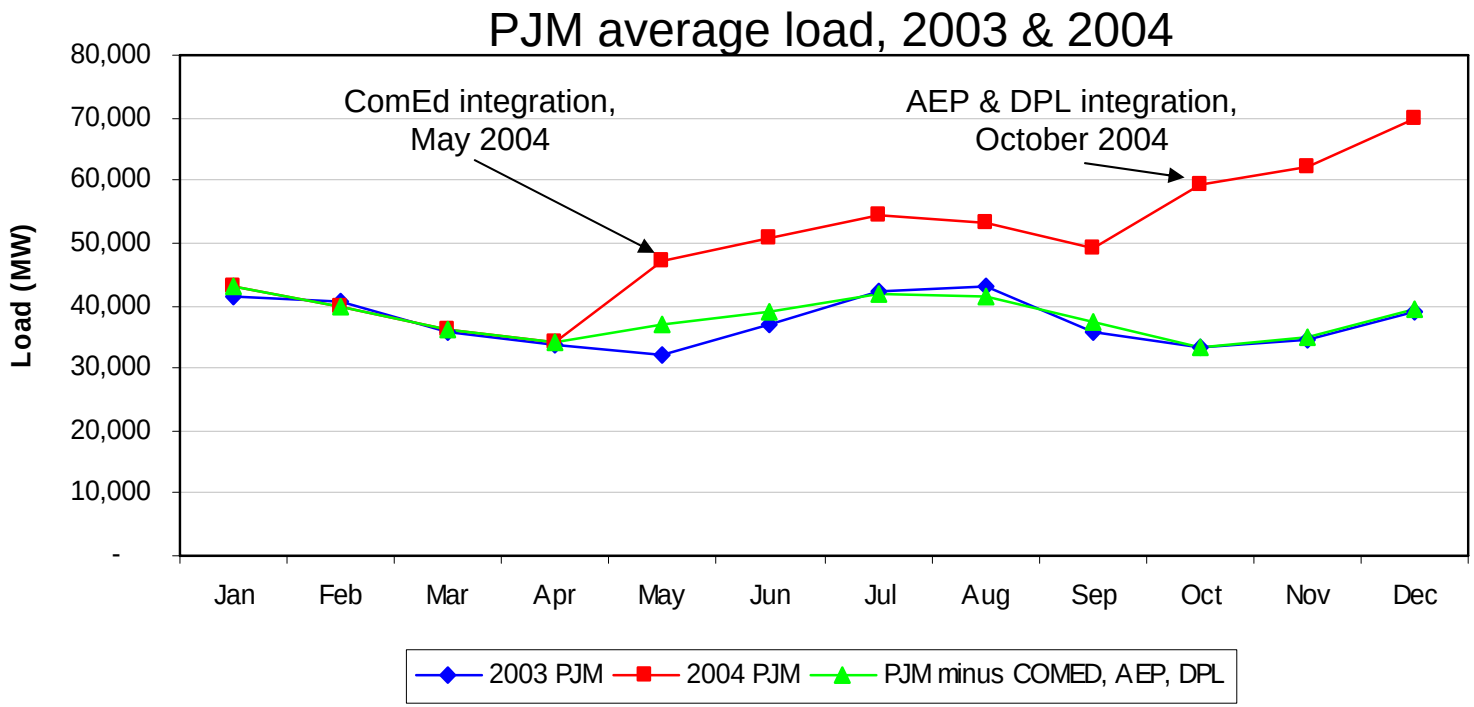
Analysis Summary:

- **PJM's 2004 State of the Market Report Conclusion:** The integration of ComEd, AEP and DPL resulted in changes to supply-demand fundamentals and a 4.2% decrease in PJM power prices from 2003 – 2004, when adjusted for fuel price increases.
- **Global Energy's Independent Analysis:** Confirmed PJMs findings and quantified savings in 2004 from the integration of ComEd, AEP, DPL & PJM supply & demand at $29.5MM for PJM and $36.4 MM for the Eastern Interconnect.
- Because ComEd integrated in May 2004 and AEP/DPL in Oct 2004, benefits not realized over entire year 2004. Global Energy estimated annualized savings at $69.8 MM for PJM and $85.4 MM for the Eastern Interconnect for 2004.

Significance of ComEd, AEP and DPL's Integration into PJM

Resulted in major growth in PJM's market size:

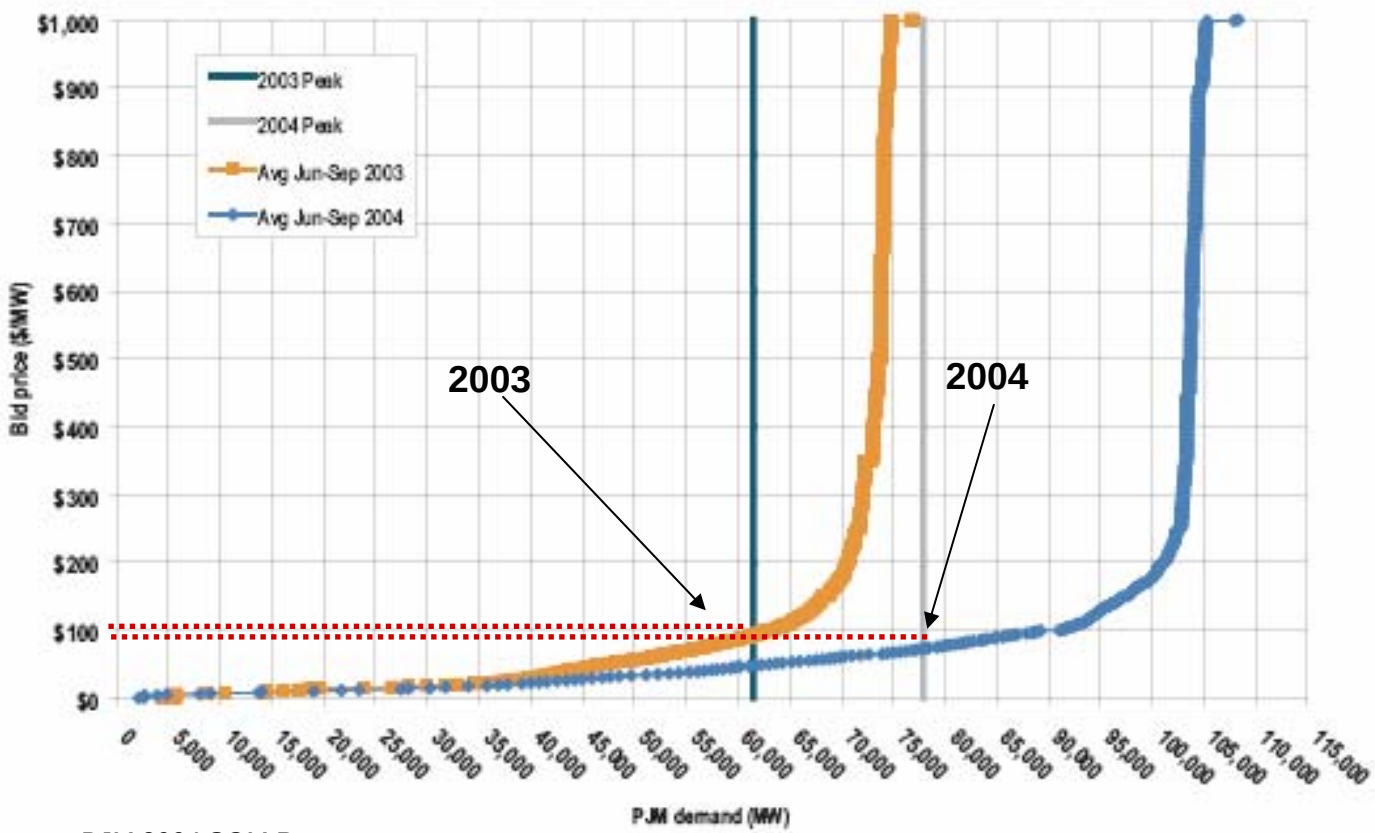
- Installed Capacity: 77,800 MW to 144,000 MW (85% increase)
- Peak Load: 61,499 MW to 81,992 MW* (33% increase)



* 81,992 MW is the 2004 coincident peak load of COMED, AEP, DPL and PJM.

PJM's Analysis of Supply & Demand

PJM showed that the integration resulted in a shift in supply/demand fundamentals which benefited PJM customers - comparatively more new supply in PJM than new demand.



Source: PJM 2004 SOM Report

Global Energy's Market Analysis Simulation Results

Results confirm PJM's conclusions that the changes to supply/demand fundamentals resulting from the integration of ComEd, AEP & DPL into PJM in 2004 benefited PJM.

Global Energy's estimated benefits:

2004 Production Cost Savings		
Market Area	**Saving based on 2004 PJM Integration Timeline (Comed in May '04 & AEP/DPL in Oct. '04)**	**Annualized Savings (Simulates Integration of ComEd, AEP, DPL on 1/1/04)**
PJM	$29.5 MM	$69.8 MM
Eastern Interconnect	$36.4 MM	$85.4 MM

Other benefits of PJM membership not analyzed. Such benefits could be captured in a comprehensive, LMP-based market simulation and cost benefit analysis.

Global Energy's PJM Market Analysis
Annualized Simulation Results