Overview of the PJM RTO

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State and Member Relations
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Presentation Outline

- Geography and Statistics
- Roles and responsibilities of a Regional Transmission Organization (RTO)
- Governance
- Historical Background on PJM and US deregulation

PJM as Part of the US Eastern Interconnection

6,038
substations

Key Statistics

PJM member companies	550
millions of people served	51
peak load in megawatts	144,796
MWs of generating capacity	165,303
miles of transmission lines	56,070
GWh of annual energy	728,000
generation sources	1,271
square miles of territory	164,260
area served	13 states + DC

26% of generation in
Eastern Interconnection

23% of load in
Eastern Interconnection

19% of transmission assets
in Eastern Interconnection

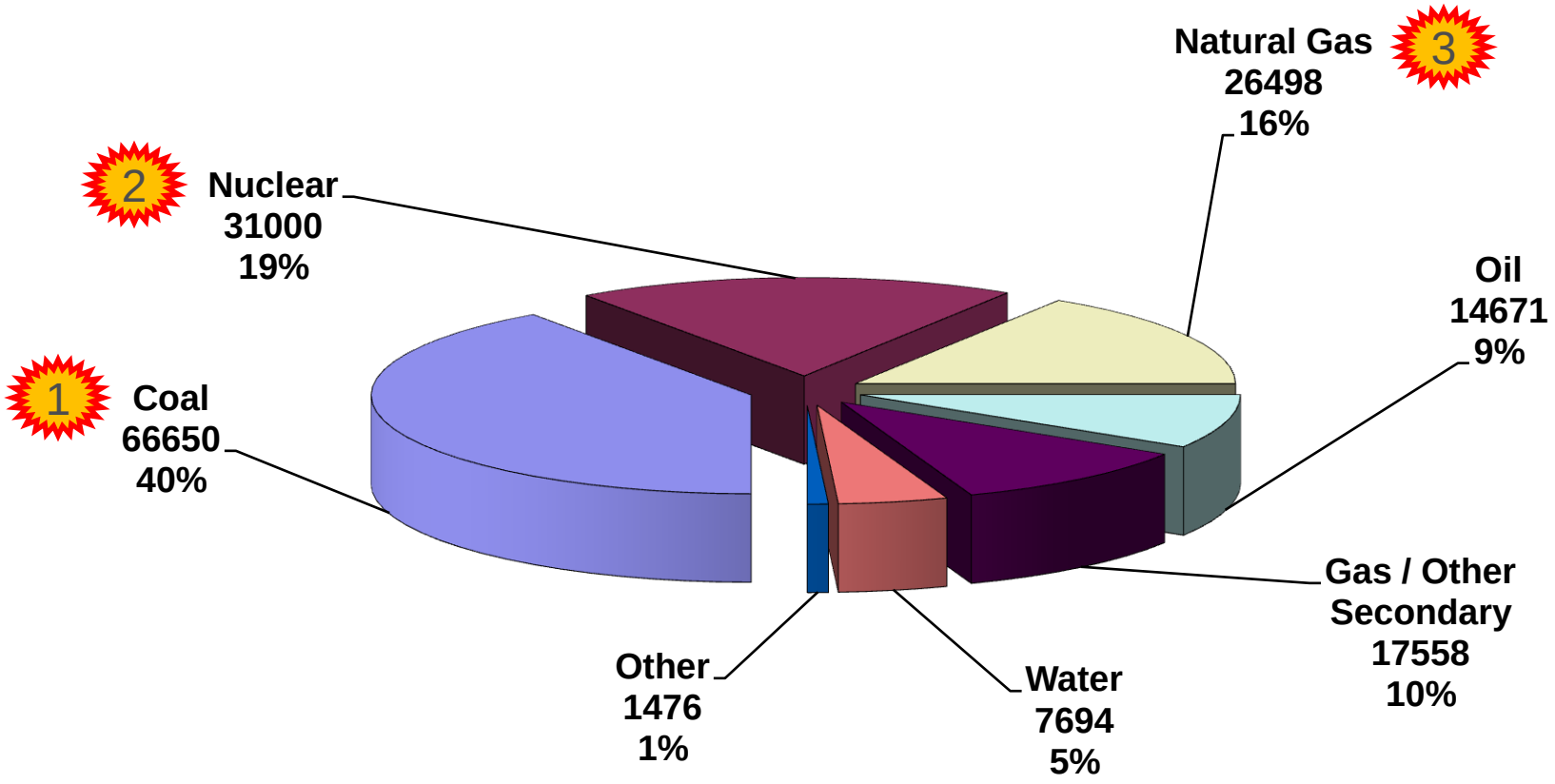
19% of U.S. GDP produced in PJM

PJM Statistics

Number of PJM Members	Members: 541 Ex-Officio Members: 9 **Total: 550**
Metered End Use Customers	21.3 million
Population of Territory	51 million
Square Miles of Territory	168,500
Annual Energy Delivered	758,832 GWh
Average Monthly Billing (2008) ($ billion)	$2.9
Cumulative Billing Since 1997 ($ billion)	$137.5

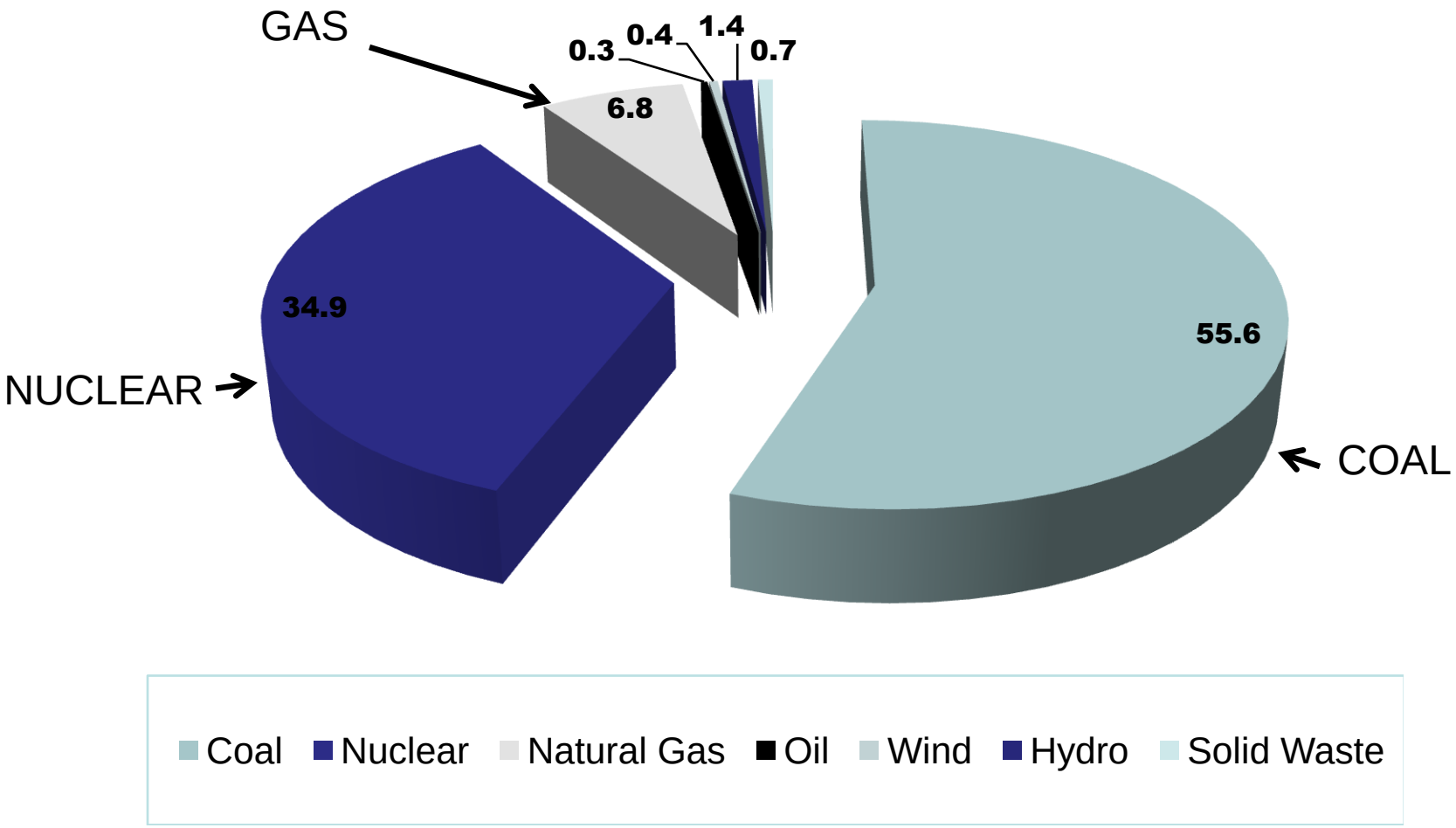
Installed Capacity By Fuel Type

Capacity By Fuel Type -- 165,547 MW installed capacity

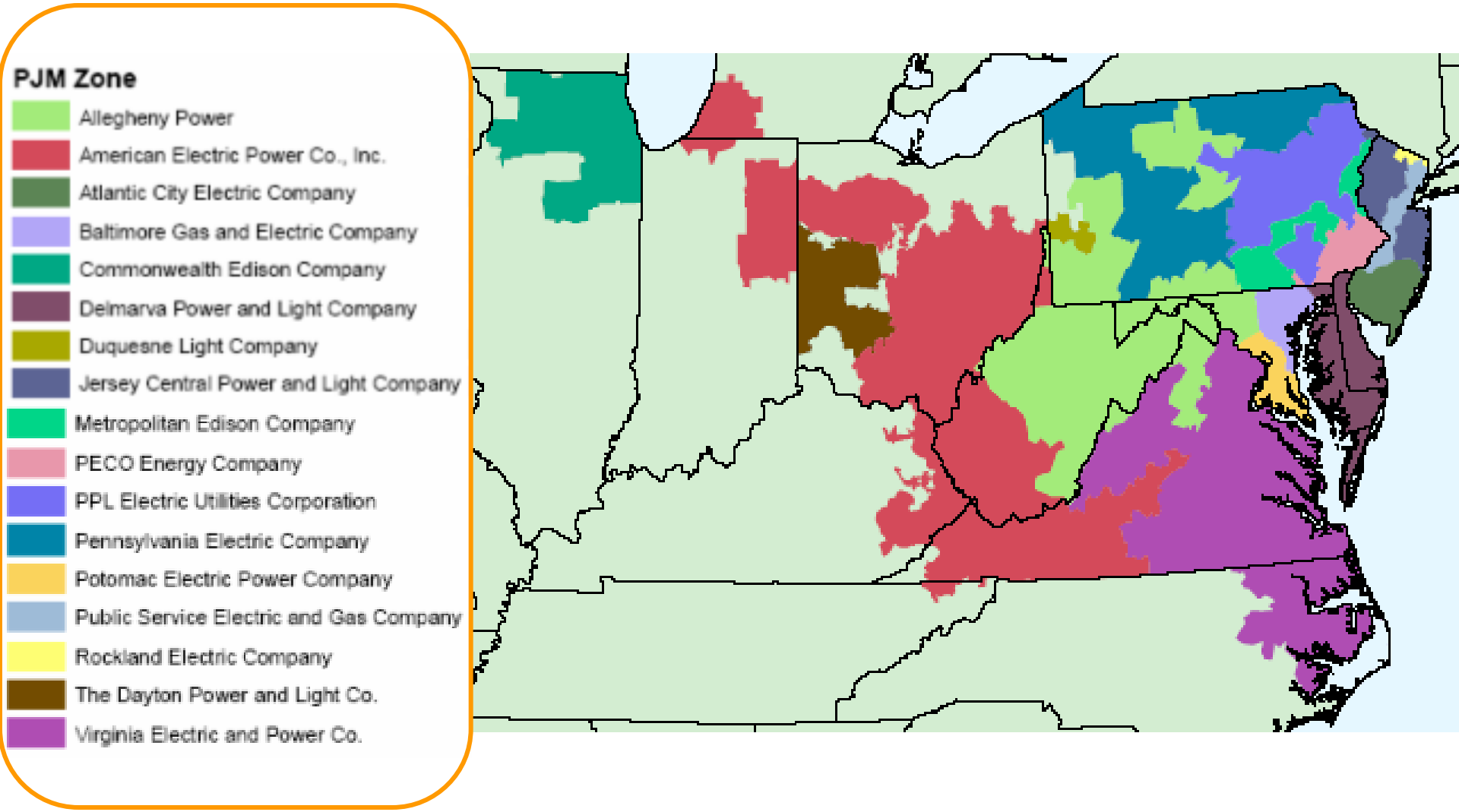


As of 12/31/08

2008 Generation By Fuel Type



The Transmission Owners within the PJM RTO



PJM as an RTO


EXISTING AND PROPOSED RTOS AND ISOS
Alberta Electric System Operator (AESO)
Ontario Independent Electricity Market Operator (IMO)
New England RTO
MISO RTO
Grid West
West Connect
SPP RTO
California ISO
ERCOT ISO
NY ISO
PJM Inter-connection
GridFlorida
WA
OR
CA
ID
NV
MT
WY
UT
AZ
CO
NM
ND
SD
NE
KS
OK
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MN
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LA
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TN
AL
OH
WV
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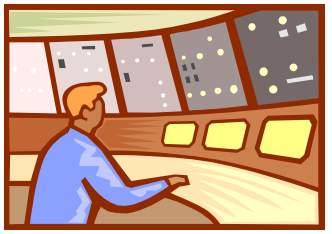
CT
NJ
DE
MD
This map was created using Platts POWERmap
December 15, 2004

- Operate the bulk electric power grid for reliability
- Facilitate various electric markets
- Plan for transmission expansion
- Share best practices with neighboring and international system operators

What is PJM?

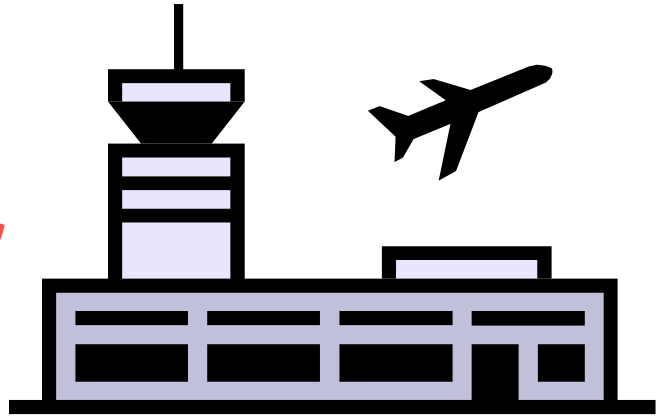


Operators of a Stock Exchange for Energy…

SIMULTANEOUSLY!

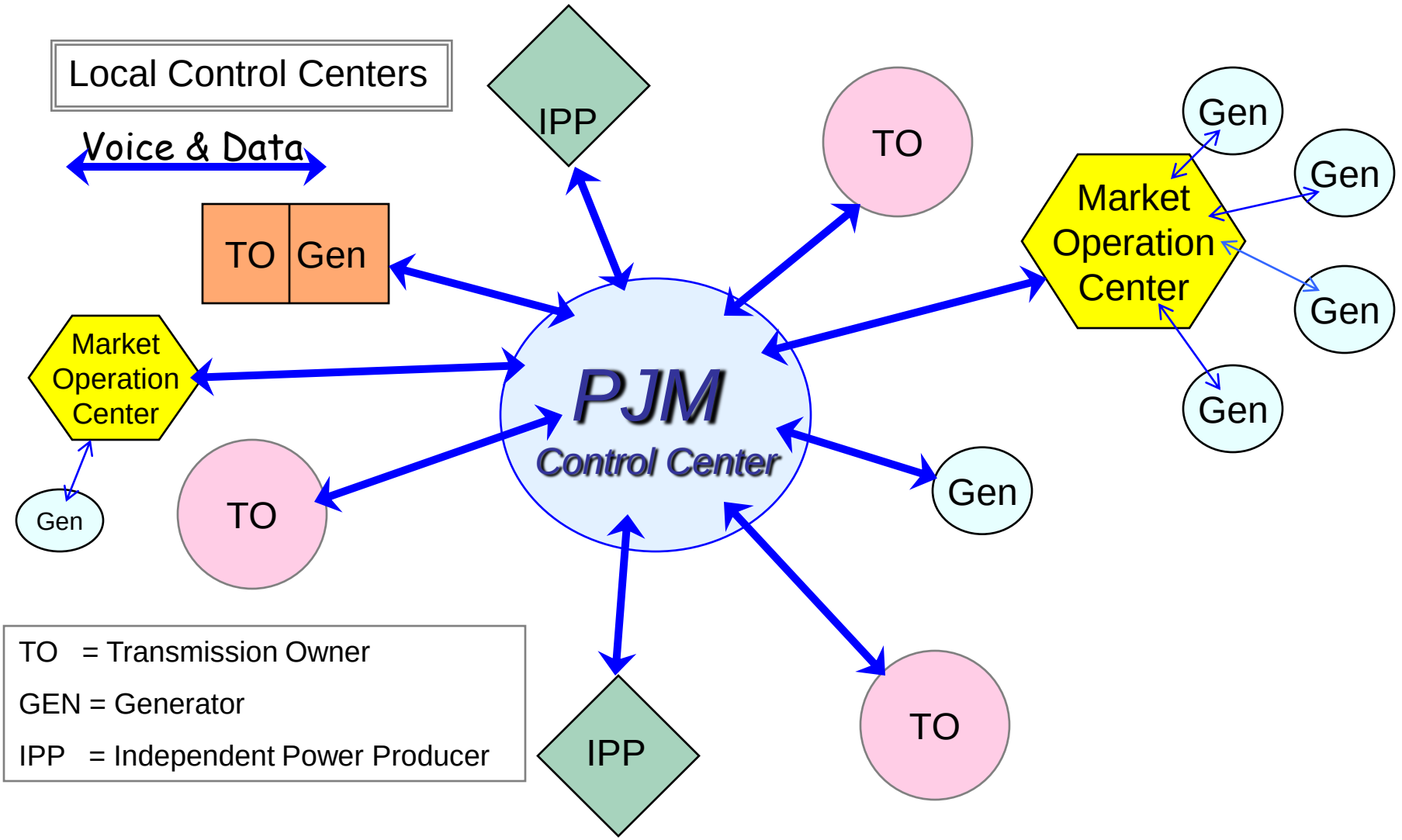
RELIABLY!

Air Traffic Controllers for the Transmission Grid….



Match Generation to Load

Communicating Information
Giving Direction

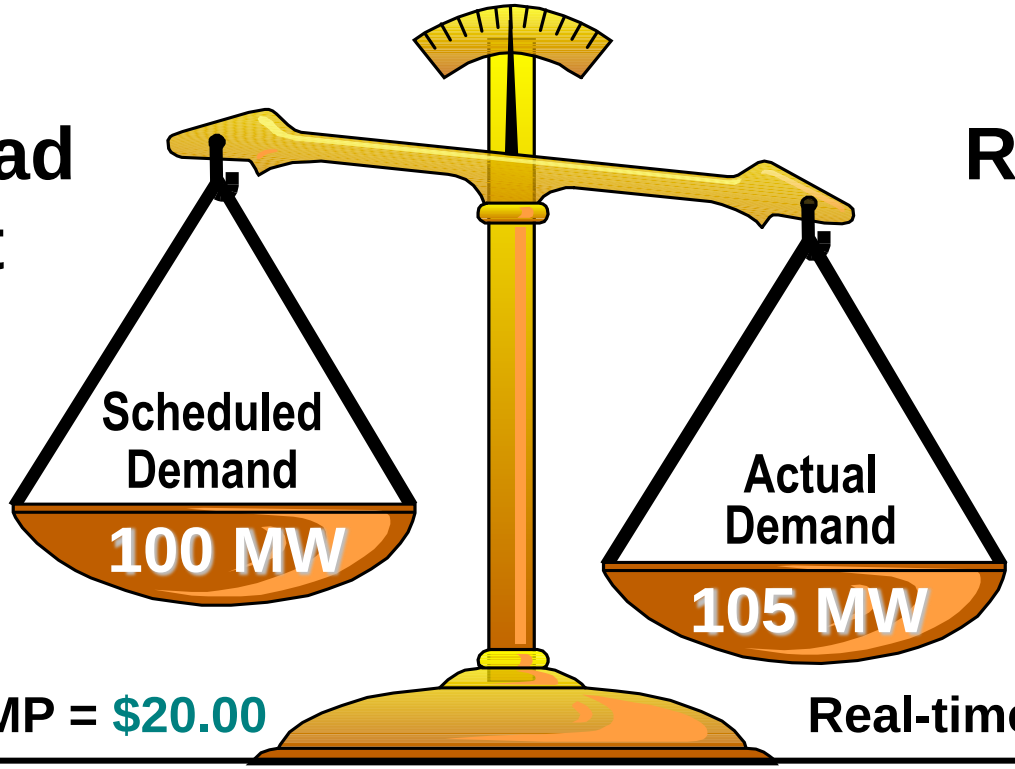


Market Design Details

- Generation Capacity Markets
  - Long-Term
- Energy Markets
  - Forward (i.e. Day-Ahead)
  - Real Time
- Financial Transmission Rights Market
- Ancillary Services Markets
  - Regulation
  - Spinning Reserve

- A day-ahead hourly forward market for energy
- It provides the option to 'lock in':
  - scheduled MW quantities at day-ahead prices
  - scheduled energy deliveries at day-ahead congestion prices
- Provides additional price certainty to Market Participants by allowing them to commit to prices in advance of real-time dispatch

- Day-Ahead Energy Market
  - develop day-ahead schedule using least-cost security constrained unit commitment and dispatch
  - calculate hourly LMPs for next operating day using generation offers, demand bids and bilateral transaction schedules
- Real-Time Energy Market
  - calculate hourly LMPs based on actual system operating conditions



Day Ahead LMP = $20.00

Real-time LMP = $23.00

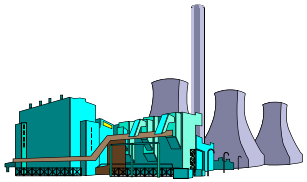
*= 100 * 20.00 = $2000.00*

= (105 - 100) 23.00 = $115.00*

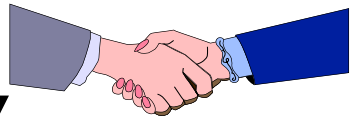
if Day-ahead Demand is 105MW = $2100.00

as bid = $2115.00

Options for Energy Supply
A Voluntary Market



Bilateral Transactions



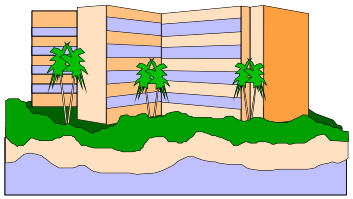
Self-schedule own resources

PJM Spot Market

Load serving entities obtain energy to serve customers

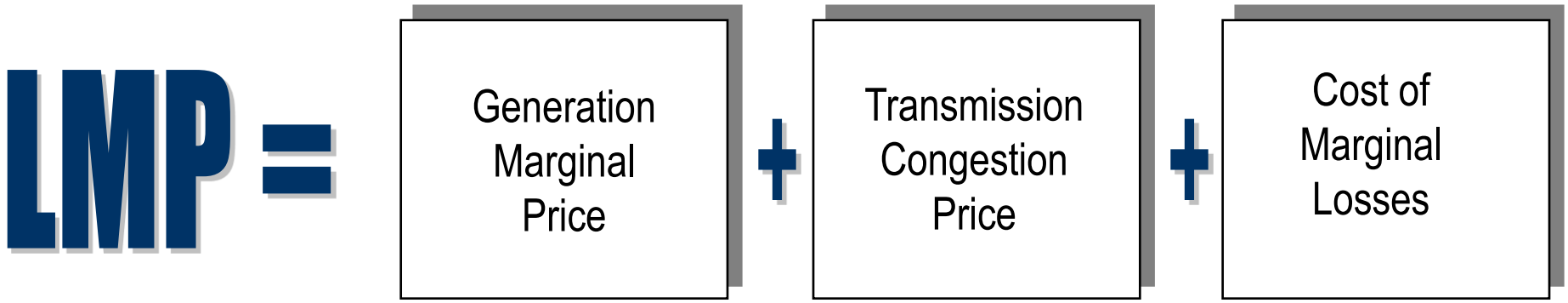
Industrial

Commercial



Residential

Locational Marginal Price



Price to serve the next MW of load at a specific location, using the lowest production cost of all available generation, while observing all transmission limits

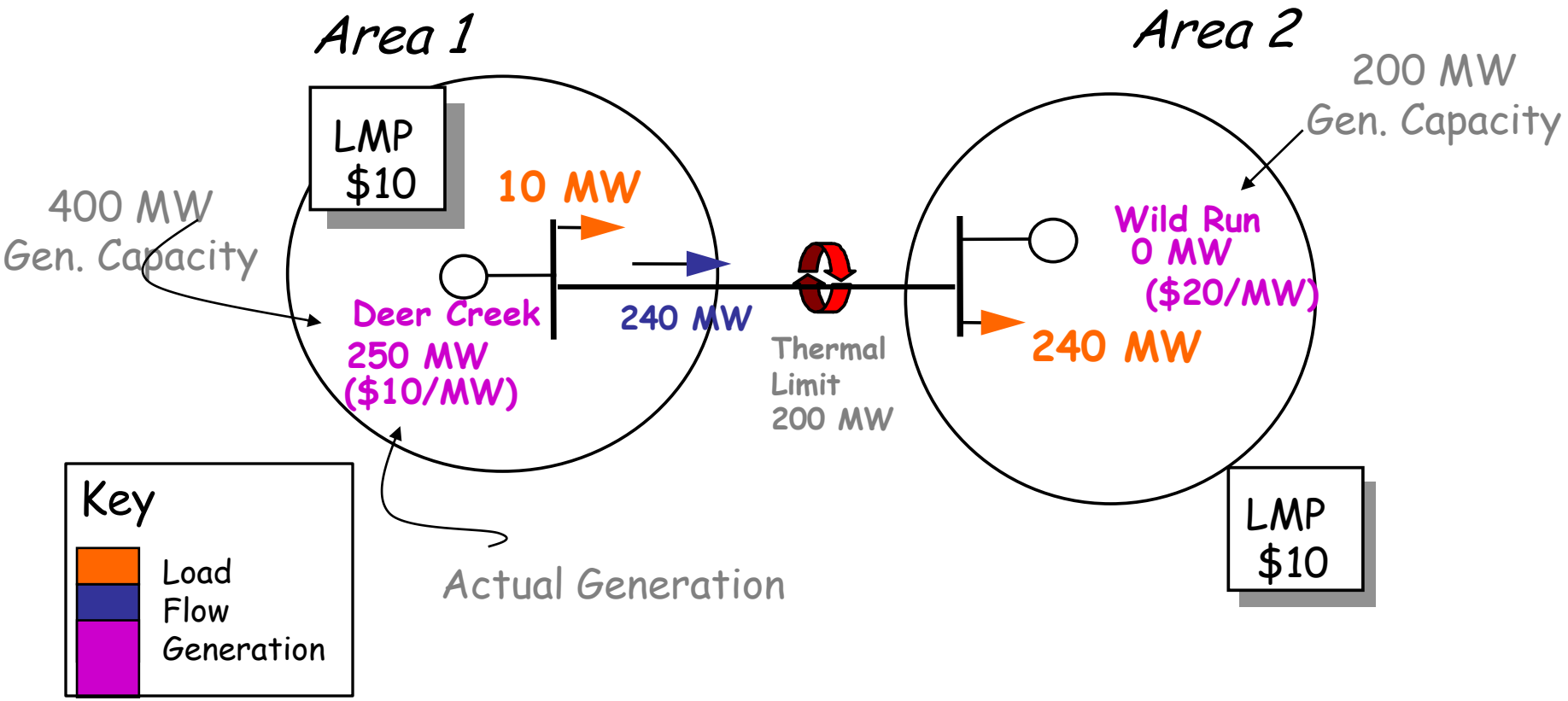
Investment Incentives in PJM Market

- Local Marginal Pricing (LMP) provides the real-time pricing signals which indicate where to build new generation or transmission

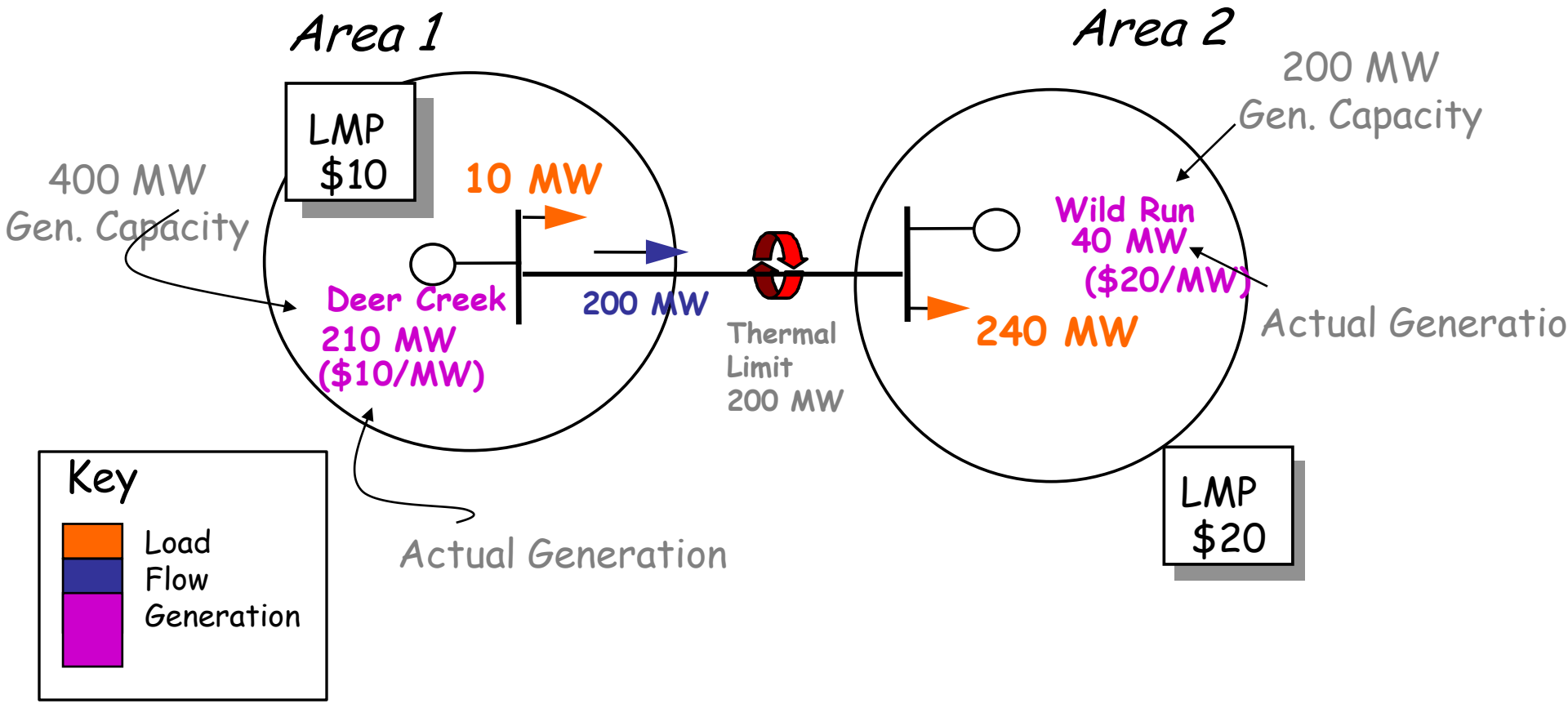
- Reliability Pricing Model (RPM) provides long term $ incentives to build new generating capacity in congested areas, along with a benchmark for bilateral contracts

- The following examples demonstrate how LMP values are determined at all locations
- The LMP values are a result of security-constrained economic dispatch actions
- LMP values are calculated based on generation offer data and the power flow characteristics of the Transmission system.

Economic Dispatch Ignoring Transmission Limitation



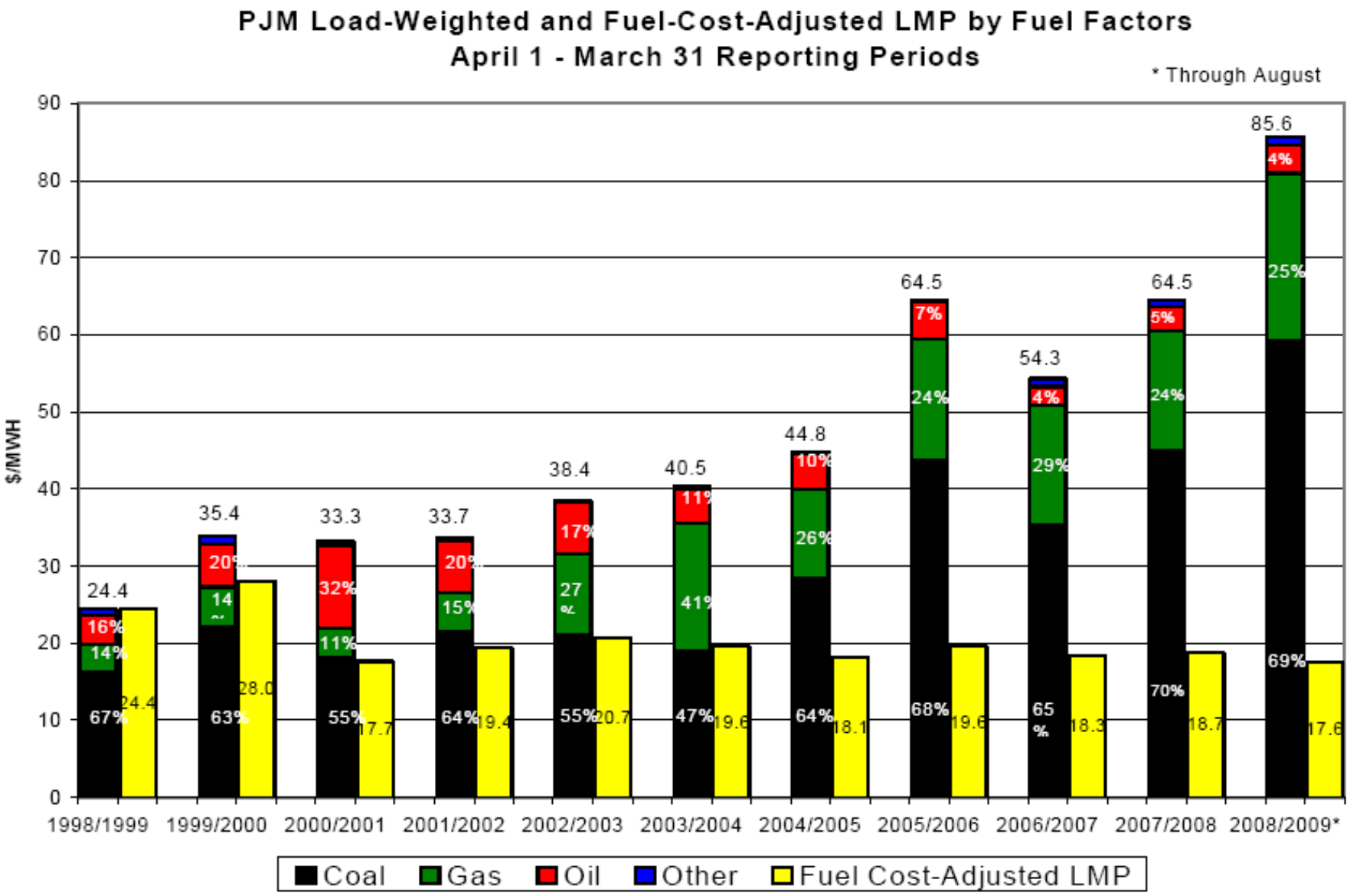
Security-Constrained Economic Dispatch



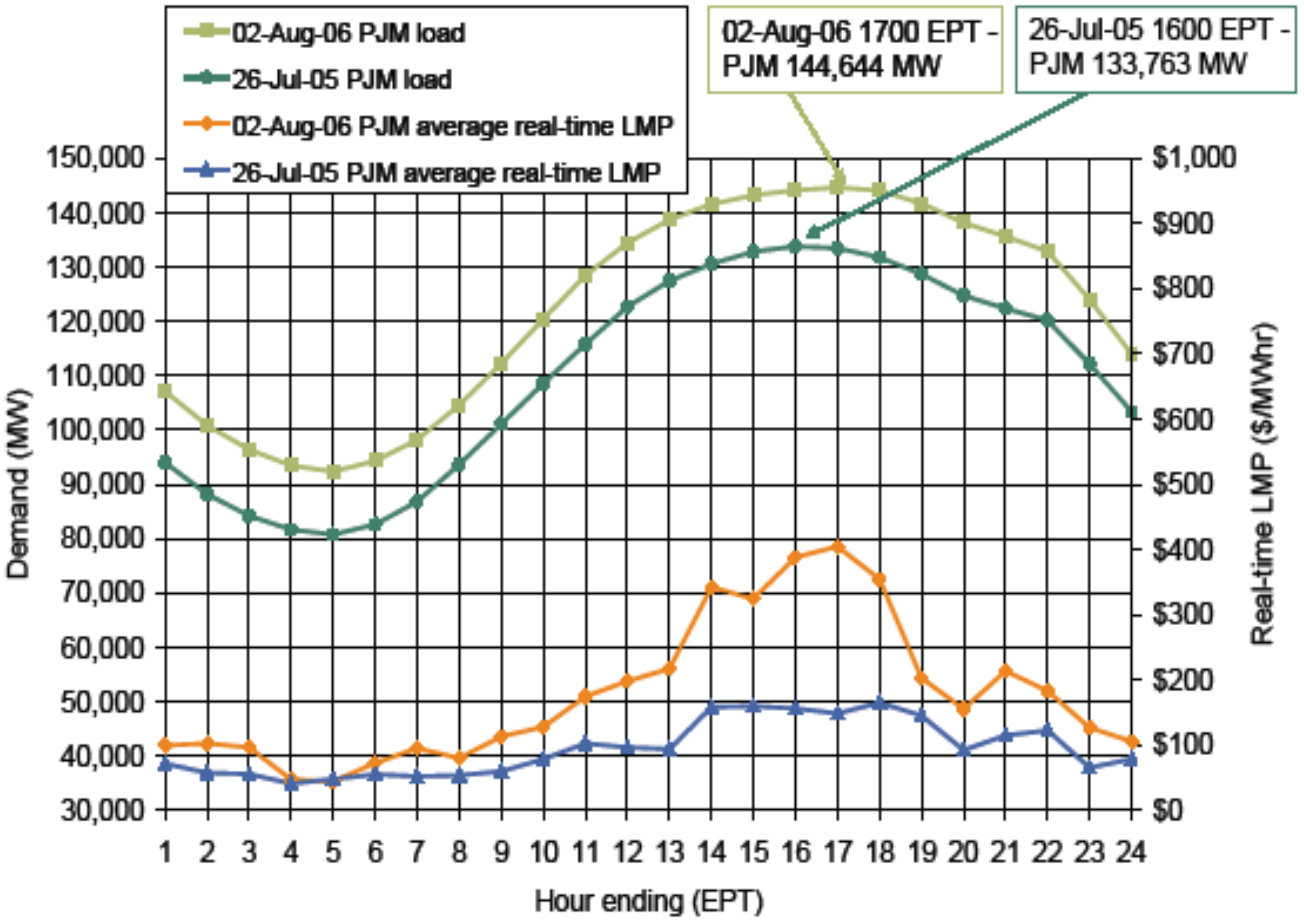
Customer	MW	LMP	Energy[1] Settlement	Congestion Credit
Area 1 Demand	10	$10	$100	-
Area 2 Demand	240	$20	$4800	$2000[2]
Deer Creek	210	$10	($2100)	-
Wild Run	40	$20	($800)	-
Totals	0		$2000	$2000

1. **Positive indicates charge, negative indicates credit**
2. **Congestion Credit is due to ownership of 200 MW Financial Transmission Right from Area 1 to Area 2, FTR Settlement = 200 MW ($20 - $10)**

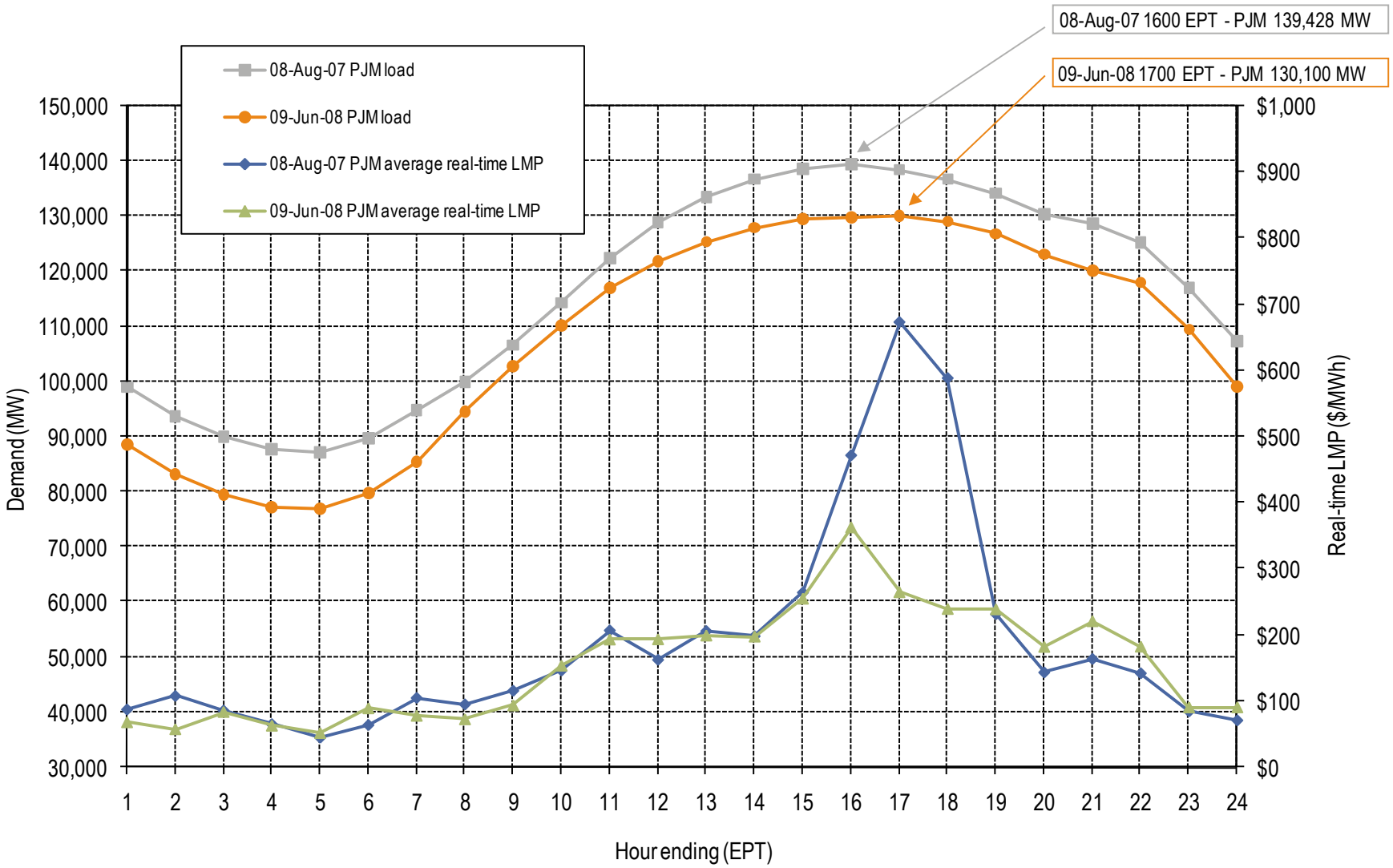
Fuel-Cost Adjusted LMP



2005 vs. 2006 Summer Peak Load Comparison



2007 vs. 2008 Peak Load Comparison



Governance

The Members have the following limited roles and authorities:

- Elect the PJM Board (9)
- Provide advice and recommendations to the PJM Board
- Amend the Operating Agreement subject to FERC approval

Governance

PJM Independent Board

Members Committee Sector Voting

Generation Owners

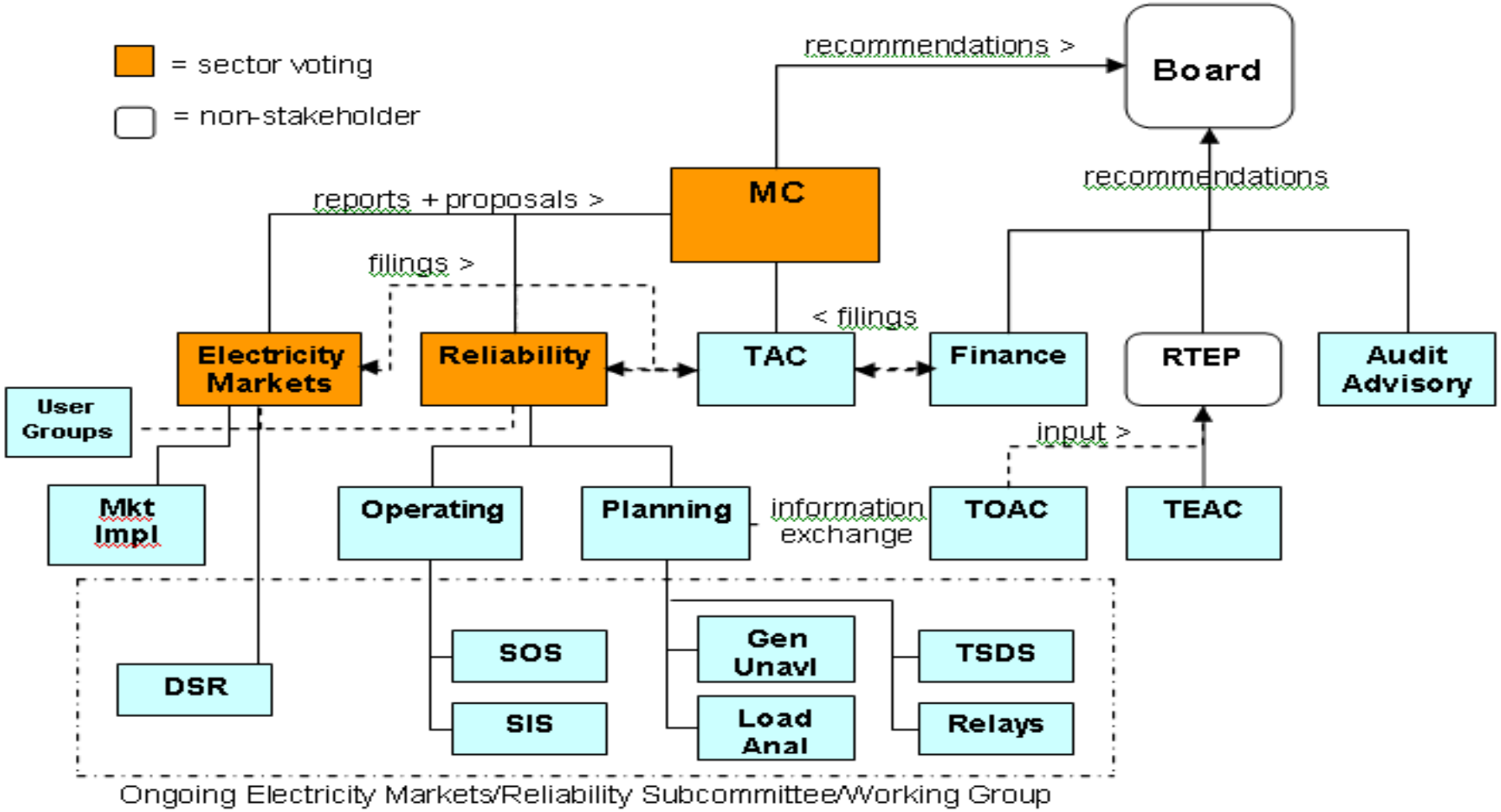
Transmission Owners

Other Suppliers

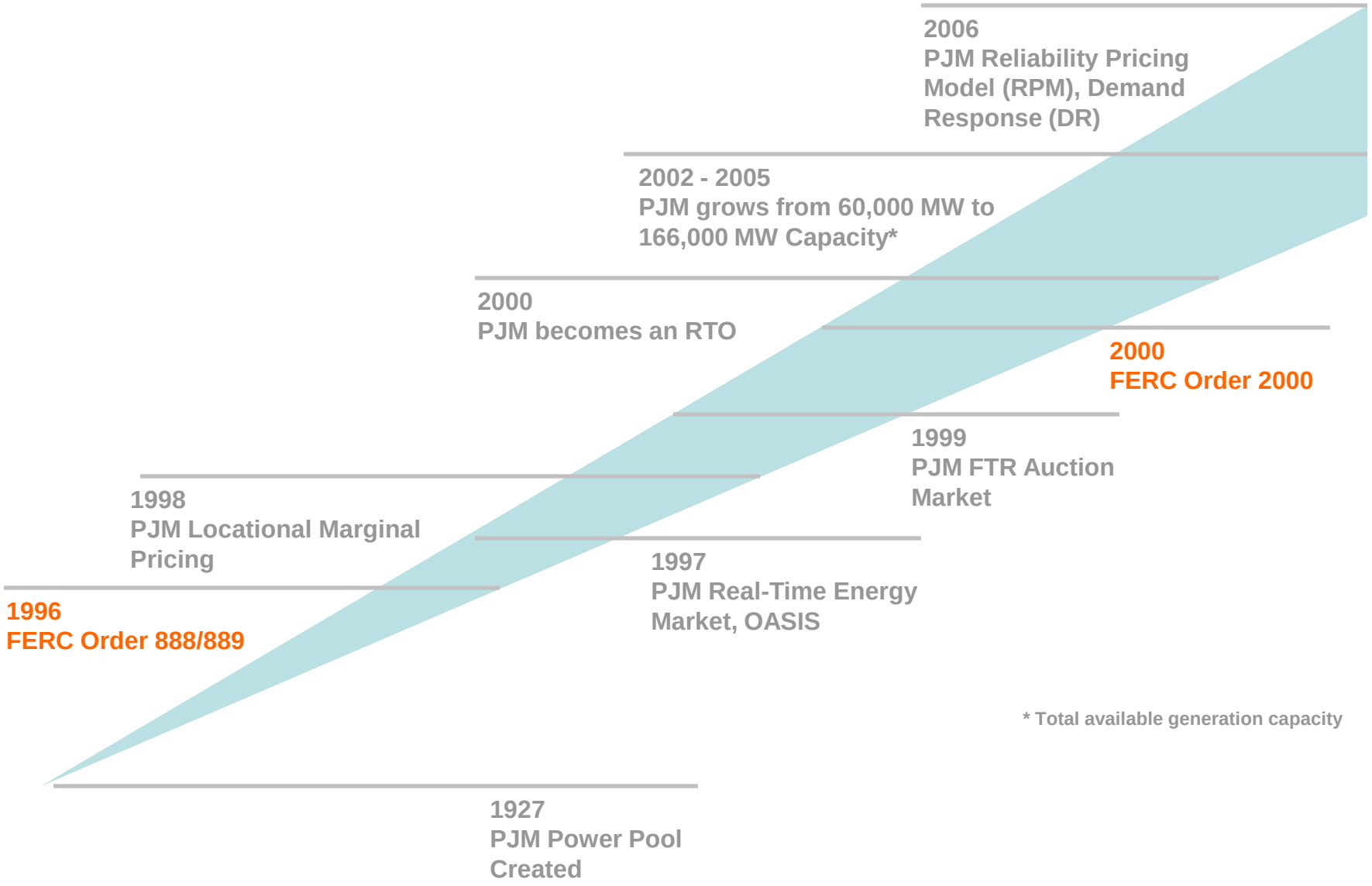
End-Use Customers

Electric Distributors

PJM Committee Structure



US Deregulation – Key Milestones



* Total available generation capacity

Deregulation vs. Regulation

Regulating agencies:

- Federal Energy Regulatory Commission (FERC)
- State Public Utility Commissions (PUC)
- Transmission Citing approved at the State level, can be overridden by FERC for DOE designated transmission corridors

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Before Competition the Regulatory System:

- Guaranteed return on assets, once approved and costs built in the rate
- Ultimately, rate payer (the customer) bears the risk
- No incentive to operate assets efficiently

Reliability Savings

PJM's ability to direct changes in the output of generating resources (redispatch) rather than curtail power-sales transactions to deal with transmission congestion enables it to deal with transmission constraints more effectively. By reducing the need for curtailments over a wide area – transmission loading relief procedures, or TLRs – PJM's narrowly targeted redispatch procedures resolve transmission constraints more quickly. This approach has significantly reduced the need for transaction curtailments to maintain transmission system reliability.

Annual savings: $80 million to $100 million

By planning for future reliability needs on a regionwide rather than a utility-by-utility or state-by-state basis, PJM's Regional Transmission Expansion Planning (RTEP) process helps focus on transmission upgrades that meet reliability criteria and increase economic efficiency.

Annual savings: $390 million

Generation Investment Savings

The large size of the PJM market area, combined with its diversity of demand and resources, reduces the overall level of capacity needed to ensure adequate reserves of electricity to meet peak demand or emergency situations. This capacity buffer, known as the reserve margin, would need to be higher without the PJM RTO. Consumers avoid the costs of additional generation to meet higher levels of reserves.

Annual savings: $366 million to $900 million

The commitment of demand-response resources to reduce load during system peaks also forestalls the cost of building additional generating facilities. Through the Reliability Pricing Model (RPM), demand response competes on an equal footing with generation and transmission in the capacity market. Through RPM, the quantity of demand response that is providing capacity in the PJM footprint has increased by more than 1,800 megawatts.

Annual savings: $275 million

Economic Benefits

Energy Production Cost Savings

PJM's centralized dispatch of the numerous resources over its expanded territory produces significant efficiencies and cost savings compared with the previous operation of independent control areas across the region. The increasing effectiveness of PJM's dispatch operations also has reduced operating reserve costs.

Annual savings: $340 million to $445 million

Grid Services Savings

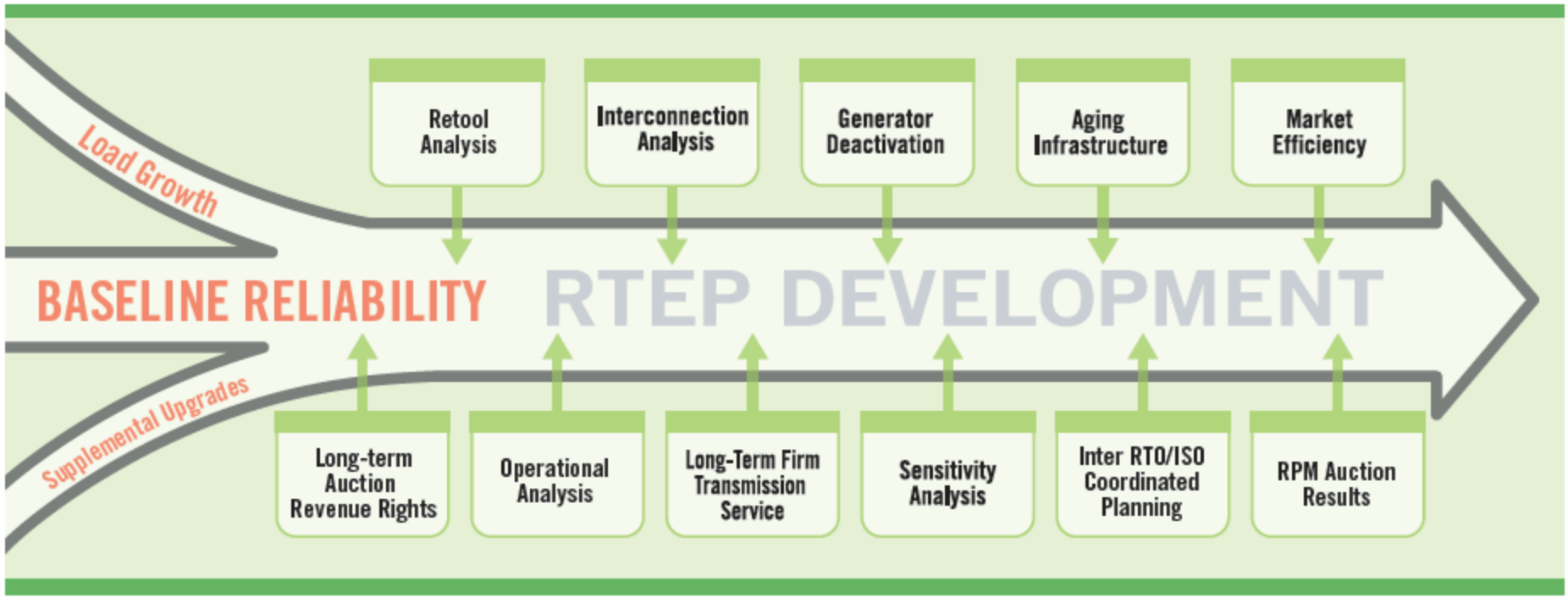
By operating markets for grid services, also known as ancillary services, across its footprint, PJM achieves economies in providing services that are essential to the reliability of the electric system. Synchronized reserve service supplies electricity if the grid has an unexpected need for more power on short notice, while regulation helps match generation and load by correcting for short-term changes in electricity use that might affect system stability.

Annual savings: $134 million to $194 million

Total –
as much as $2.3 billion in savings to the region each year

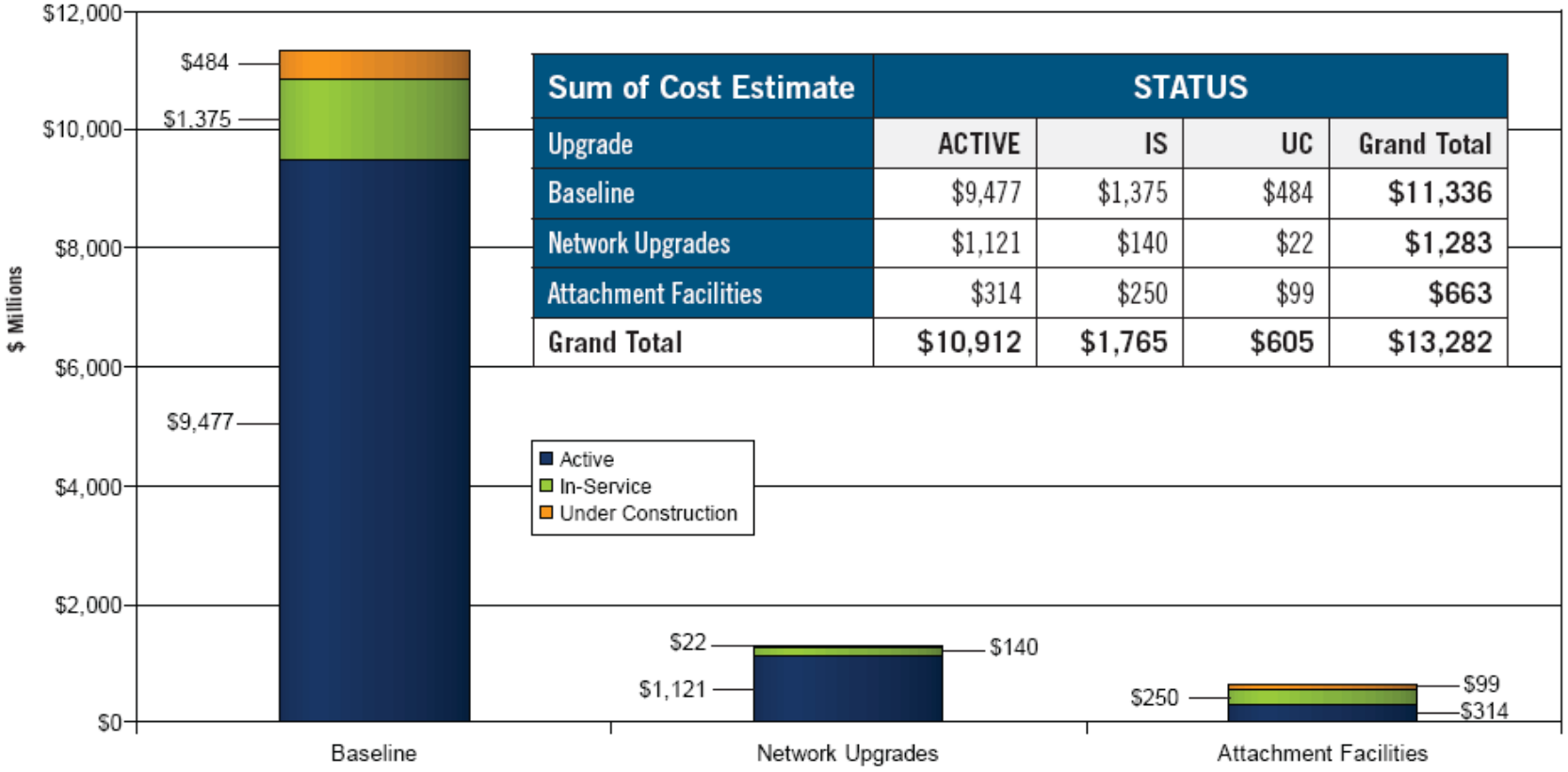
Regional Transmission Expansion Planning Report Highlights

Regional Transmission Expansion Planning Process



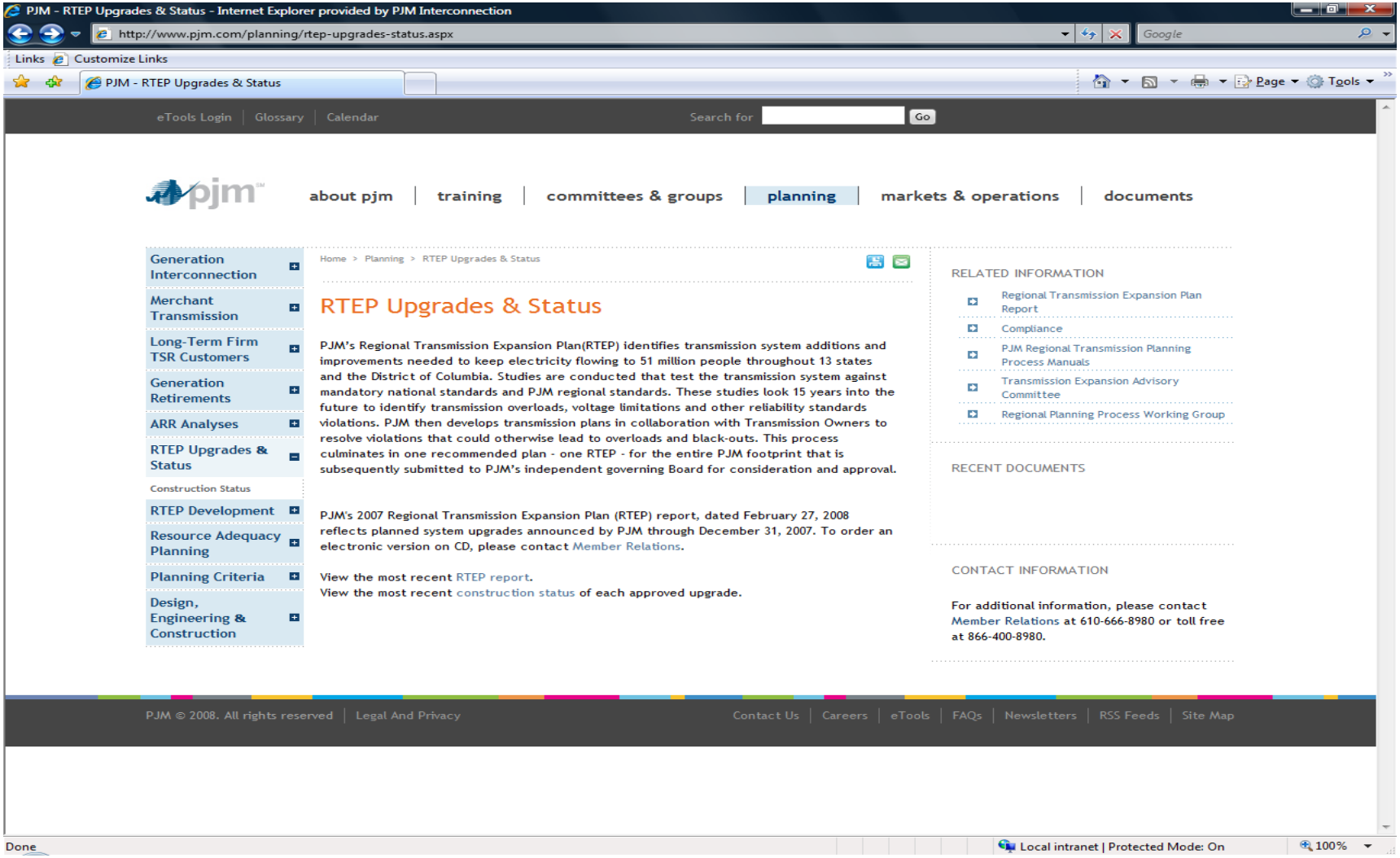
$13.2 Billion in Approved Upgrades

Since RTEPP inception in 1999 to December 2008



Sum of Cost Estimate	STATUS			
Upgrade	ACTIVE	IS	UC	Grand Total
Baseline	$9,477	$1,375	$484	$11,336
Network Upgrades	$1,121	$140	$22	$1,283
Attachment Facilities	$314	$250	$99	$663
Grand Total	$10,912	$1,765	$605	$13,282

RTEP Project Construction Status



Questions?

PJM Web site: www.pjm.com

or contact: gdowikjw@pjm.com