

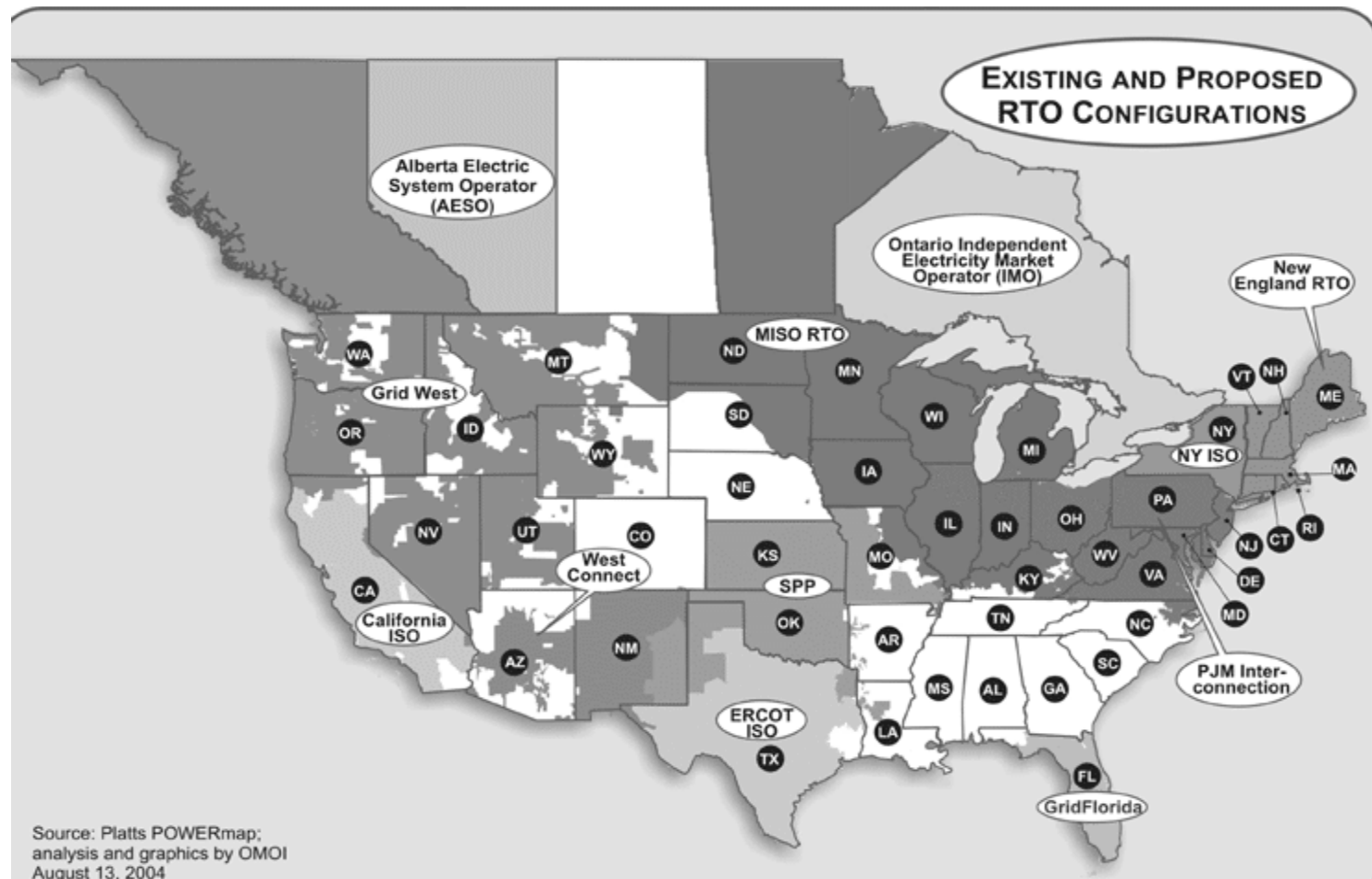
**THE MIDWEST INDEPENDENT TRANSMISSION SYSTEM
OPERATOR (MISO)
AND THE
INDIANA UTILITY REGULATORY COMMISSION**

Commissioner David Hadley
And Bob Pauley

Why Do We Want Transmission Companies Like RTOs?

- Prevent Unreasonable Discrimination in the Use of the Transmission System
- Enhance Reliability
- Improve Economic Efficiency
 - Optimal Use of the Transmission System
 - Optimal Use of Electric Generating Units
- Provide “Transparent” Real-Time Prices
- Better Long-Term Regional Planning
- All of these factors help state commissions ensure that customers are getting reliable service at the lowest cost reasonably possible.

What's New With RTOs In The United States?



A Great Deal Has Changed Since The Blackout Of August 2003



Preventing Undue Discrimination

- The electric grid in the United States evolved from individual utilities being “islands.”
- The U.S. has a history of undue discrimination in the use of the transmission system.
- The Federal Energy Regulatory Commission requires “Open Access Transmission Tariffs” – Similar to the Golden Rule: “*Do Unto Others As You Would Have Them Do To You.*”

IMPROVE RELIABILITY

- The August 14, 2003 Blackout Served As A “Wake-Up” Call – we hope. Congress still hasn’t acted on enforceable reliability requirements.
- RTOs, should reduce the communications and control problems that allowed the blackout to cascade.
- RTOs should reduce constraints on the transmission system that, historically, have caused curtailments of transactions.
- RTOs dispatch should coordinate maintenance outages of generating and transmission facilities to better assure a reliable system at all times.

Improve Economic Efficiency

MATHEMATICALLY EVERY UTILITY WILL BENEFIT AND NO UTILITY WILL BE WORSE OFF

Our economic analysis projects that the introduction of centralized security-constrained economic dispatch using Locational Marginal Cost Pricing (LMP) will result in annual gross production cost savings of approximately \$255 million throughout the Midwest ISO region. Furthermore, the implementation of regional dispatch will allow for more efficient use of the existing transmission and generation assets, which should not only lower spot energy prices, but also put downward pressure on prices in bilateral contracts, resulting in a potential annual gross savings of approximately \$713 million to energy consumers.

Dr. Ron McNamara of the Midwest ISO

This does not include the expected substantial cost savings resulting from better regional planning of new generating units (including meeting new stringent environmental requirements), transmission facilities and the utilization of demand-response programs.

Price Transparency

- For markets to function well, accurate prices need to be observable to all.
- Investors in energy infrastructure need this information to make informed decisions about generation, transmission, and demand response.
- Customers need this to allow them to make informed choices about their energy use.
- Effective monitoring of the markets requires transparent prices to reduce the potential for abuse and anticompetitive behavior



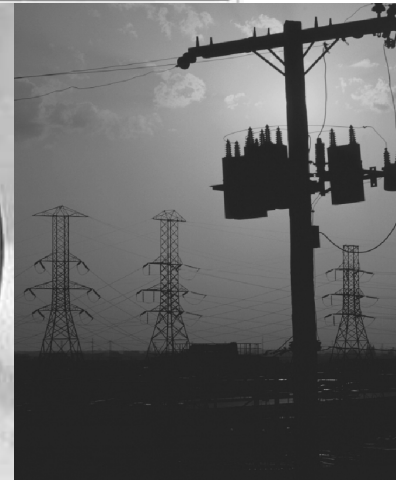
Comprehensive Regional Planning

- Transmission planning necessitates an open process.
- Transmission must be evaluated in context of all cost-effective alternatives such as generation and demand response.
- Investment decisions driven by reliability and economic efficiency are interrelated and both should be considered.
- Pricing transmission ought to be as simple as possible but as complex as necessary while also being as fair, efficient as possible while enabling the owners of the facilities to recover sufficient revenue.



How Do We Assure That Supply Will Be Equal To Or Greater Than Demand?

- Incentives Have Been Proposed As A Means Of Encouraging New Cost-Effective Investment.
- What Do We Need To Do Assurance That Generation, Transmission, Distribution, And Demand Response Programs Will Be Built And Available?



It Used To Be A Lot Easier To Build Generating Units

- Economies of Scale
- Environmental Restrictions
- Fuel Availability and Costs
- Restrictions on Location

MARCH 12, 1887. THE ELECTRICAL WORLD.



EDISON LIGHT

Edison United Manufacturing Co.,

16 AND 18 BROAD STREET, NEW YORK.

ESTIMATES FURNISHED FOR ISOLATED PLANTS,
For use in Mills, Hotels, Theatres, Steamboats, etc., etc.

More than **500,000** EDISON LAMPS IN USE in the UNITED STATES.

A CARD TO THE PUBLIC.

The Edison Electric Light Company having instituted suits on its patents, must decline to substitute the advertising columns of the press for the courts for the purpose of their legal interpretation. Mr. Edison's carbon filament patent of 1879 covers broadly the modern incandescent lamp. The claim that this patent has ever been in litigation in the United States Patent Office is absolutely false. In Germany and England, this fundamental patent has finally prevailed against all infringers, thus establishing the fact that Mr. Edison's great invention has been nowhere anticipated; ergo, a like result must follow in the United States. The straining and distorting of these facts, together with the violent effort to interweave with them certain minor and irrelevant cases for the purpose of fraudulently posing before the public as joint heirs with Mr. Edison in the fruits of these patent decisions, only indicate the dire extremity of those who are thus gradually becoming environed by due process of law.

EDISON ELECTRIC LIGHT COMPANY,
By EDWARD H. JOHNSON, President.

How Do We Make Sure That The Right Types Of Generating Capacity Will Be Built And On Time?

- **How Will New Baseload Generating Units Be Built?**

- In 1998 and 1999 the Midwest experienced significant price spikes – the price of electricity on the wholesale markets went to \$1.00 / kWh! Merchant power plant developers flooded the market in anticipation that these price spikes would be the norm – they proved to be the exception.
- The “irrational exuberance” of the price spike era is over and few want to build any generating unit.
- Many of the baseload units are at the end of their useful life. In part, this is due to Clean-Air standards. What will fill the void for these units?
- How will the United States respond to concerns about coal? Will we give serious consideration to “Clean Coal” technologies? If Congress and the President finally address the nuclear storage issue, will nuclear power be more acceptable? With the high price and extreme volatility in natural gas prices, how much reliance does the United States want to place on natural gas?

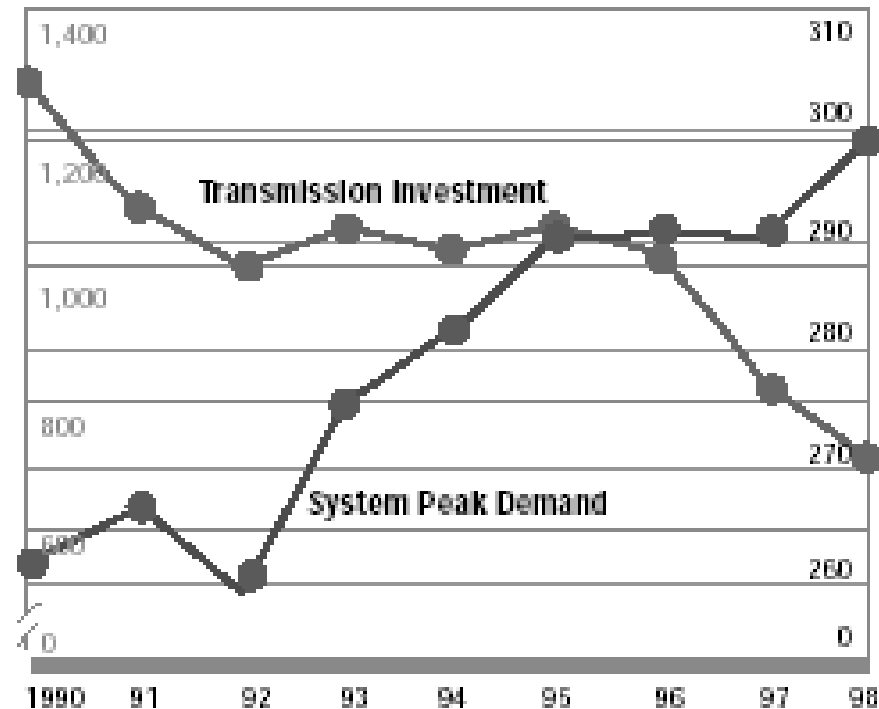
Ironically, the market signals haven't worked well. PJM is considering incentives to get firms to build power plants. It may be that firms will only want to build in states that have traditional regulation because of the greater assurance of cost recovery.



How Much Transmission Is Needed?

- **Do We Really Need More Transmission?**
 - Following the blackout, there seemed to be a consensus that the United States was woefully underinvested in transmission. As the chart illustrates, there was a drop in transmission related investment from the 1990s. If this graph were to go back to the 1970s and 1980s, it would show a substantial increase due to the construction of large baseload generators during this period. Why the decrease?
 - During the 1970s and 1980s the utilities had substantial excess capacity at a time when the economy had extraordinary interest rates, double digit inflation and very high fuel prices. Despite higher rates, utilities experienced a profit squeeze. Too many, reduced their investment in transmission construction and maintenance.
 - Very few baseload units have been built or even contemplated since 1980.
 - To varying extents, generation (and demand response) is a substitute for transmission.
 - Transmission is very difficult to build – harder than building a generating unit.
 - It may also be that there are greater financial incentives for building generating units than transmission facilities. That is, if a utility can recover the cost and the return is based on the investment, generating facilities can be more lucrative.
 - To some extent, we may be able to get more out of our existing wires. Historically, overloads on the “wires” were handled by physically terminating power transactions (“Transmission Loading Relief” – TLRs). We are hopeful that when “congestion” occurs in the future that pricing (“Locational Marginal Cost Pricing”) that Regional Transmission Organizations - RTOs will provide better price signals to:
 - Clear congestion by making sure that those that value the transaction the most – native load – will get the power while those that can make other arrangements, will reduce their use of the grid at critical times.
 - Spur development of new transmission, generation, and demand response.
- We should not over-react or under-react. It is essential that the Investment in new transmission is the most cost-effective alternative so as to prevent under-investment in generation or demand-management.

U.S. Investment in New Electric Power Transmission
(Millions of 1990 Dollars)



Growth in peak demand for electricity has far outstripped investment in transmission capacity. As a result, transmission constraints could aggravate already limited supplies of power and could result in high prices in some areas of the country.

Source: PA Consulting Group, based on data from the EIA data base.

Performance Dimensions Of The Transmission System

- Costs of congestion, losses, ancillary services
- Network operating and maintenance costs
- Availability of network components and efficiency of outage restoration in response to congestion and loss costs.
- Reliability of the network
- Costs of market power and other market inefficiencies affected by the operations of and the investment in the network
- Efficiency with which the investment framework mobilizes capital for intra and inter-RTO expansion for meeting reliability and economic efficiency goals.
- Efficiency with which innovation in software and hardware are adopted for improving all aspects of network performance.

Midwest ISO's Day 2 Markets

- **Operations of the “Day-Ahead” Market**

Market participants bid their capacity and load requirements 24 hours in advance so that the Midwest ISO can run simultaneous feasibility studies to make sure that the system can handle all of the transactions. These transactions are financially binding. If, for example, a company tells the Midwest ISO that they are going to have generating units operating in the next day and they don't, the company has to pay the costs in the real-time market.

- **Real-Time Energy Market Operations**

This is a bid-based security constrained economic dispatch that uses the lowest cost combination of power plants at any moment in time. Differences between the real-time and day-ahead markets are reconciled. Some pay more and others pay less depending on the supply and demand.

- **Locational Marginal Cost (LMP)**

- Pricing Differences in prices resulting from transmission constraints are reflected in the LMP prices. Those transactions that have a higher value are more likely to flow while market participants that have lower value transactions may conclude that they don't want to pay the LMP costs and will reconfigure their transaction. Historically, congestion was handled by Transmission Line Loading Relief (TLRs) that physically curtailed transactions.

- **Providing Ancillary Services**

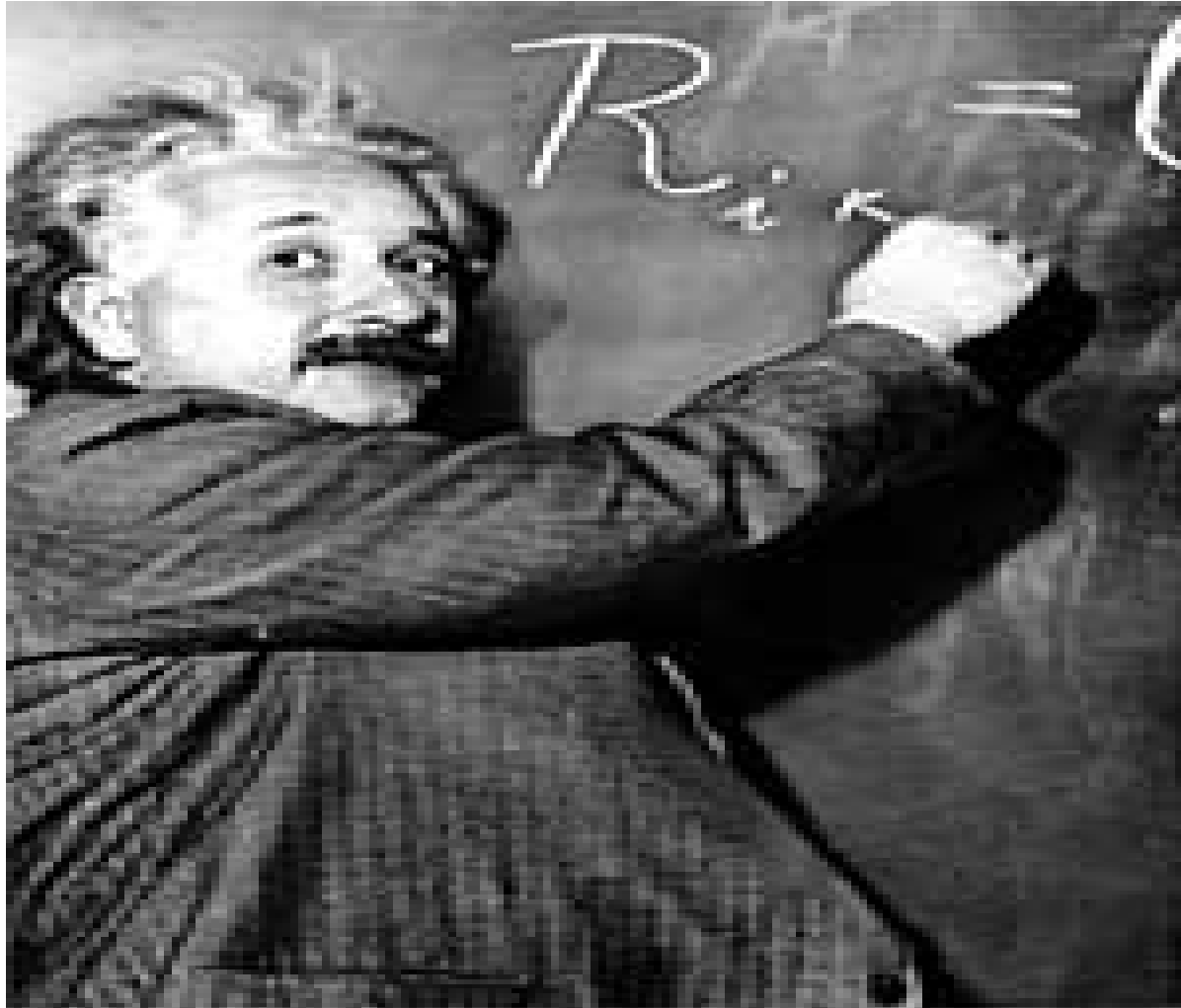
Voltage support, load following, balancing... are arranged by the Midwest ISO. These are currently provided by utilities (control areas).

Good Idea To Document Benefits And Costs

- Ideally, you could compare the costs and benefits of the present arrangements to a period after RTOs are operational
- Most RTO costs are not new costs. Many costs are already being born by existing utilities
- Most RTO benefits are new

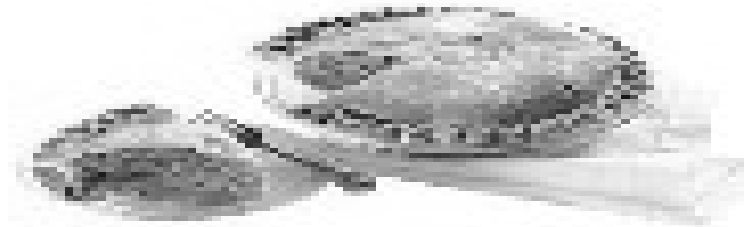


"Not everything that counts can be counted, and not everything that can be counted counts."



To Develop Benchmarks For Comparisons To Similar Organizations Or To Track Costs Over Time, Costs Should Be Separated Into “Day-2” Functional Categories Not By Accounts Or By Departments

- Tariff Administration
- Regulatory / Governmental Mandates (e.g., changes after the blackout)
- Other Regulatory Restrictions
- System Planning
- Board of Directors
- Employee Training
- Stakeholder Participation
- Market Monitoring (separate out monitoring, communication, personnel, data storage, costs of mitigation),
- Operation of Real-Time Markets
- Operation of Day-Ahead Markets
- Financial Transmission Rights (allocation and auction)
- Billing and Reconciliation
- Ancillary Services
- “Socialized” or “uplifted costs” (those costs that can’t be directly assigned so everyone pays).



**PIE CHARTS
MIGHT BE
USEFUL TO
PRESENT THE
DATA**

? R^2 - No, as the picture shows, ? Are Round

Performance Dimensions Of The Transmission System

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A Clear Regulatory Framework Is Essential

- The regulatory objectives must be clearly articulated
 - What needs to be done?
 - How will performance be measured?
 - What instruments will the transmission system operator be empowered with to achieve these objectives?
- The integration of reliability and economic goals and objectives is especially important.
- Effective regulatory mechanisms must align the incentives faced by the regulated firm with the performance goals of the regulator.
- As we know (the blackout for example) electricity doesn't respect state or national boundaries, so solutions to problems should also cut across national and state boundaries. Maybe this means having commissions in two or more states (nations) hold common hearings.

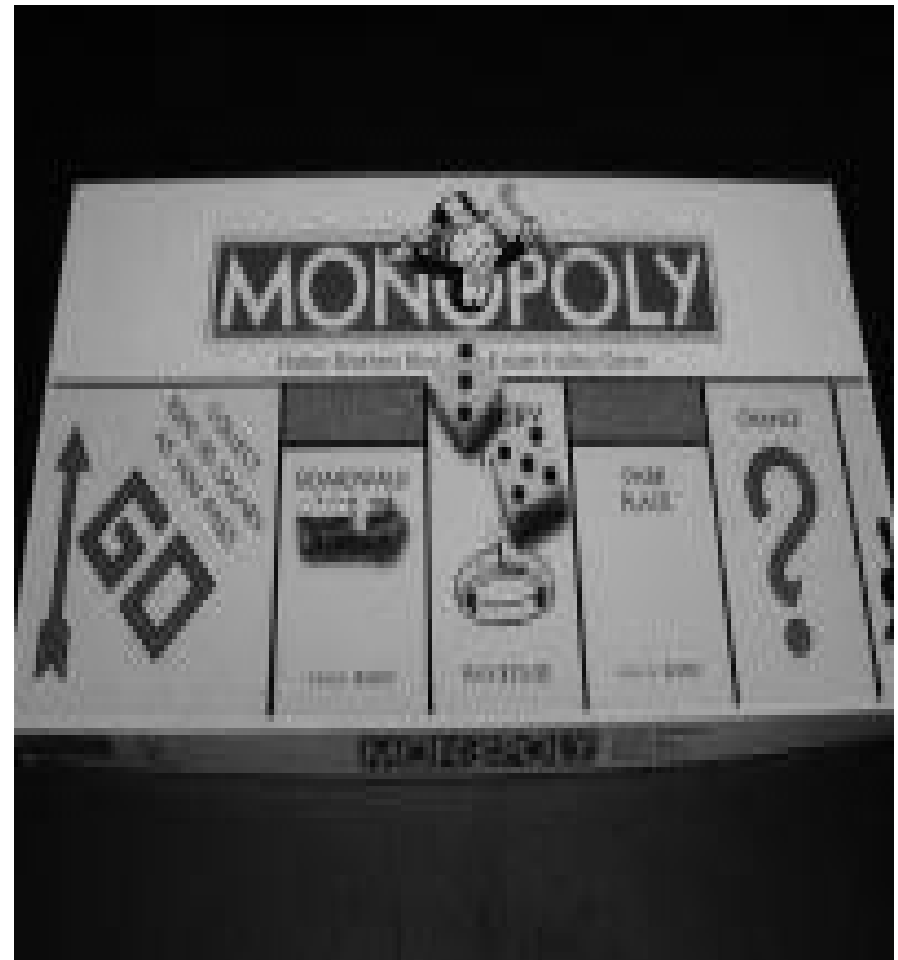
Market Monitoring And Governance Of The RTO Is Essential

- After ENRON (and others) What Lessons Have We Learned?
 - There is a demonstrable need for truly Independent monitoring of the electric and natural gas markets
 - There is a need to mitigate abusive behavior in the real-time markets
- Corporate Governance
 - There is a need to make corporations and their directors more accountable to investors / Stakeholders, and the public interest.



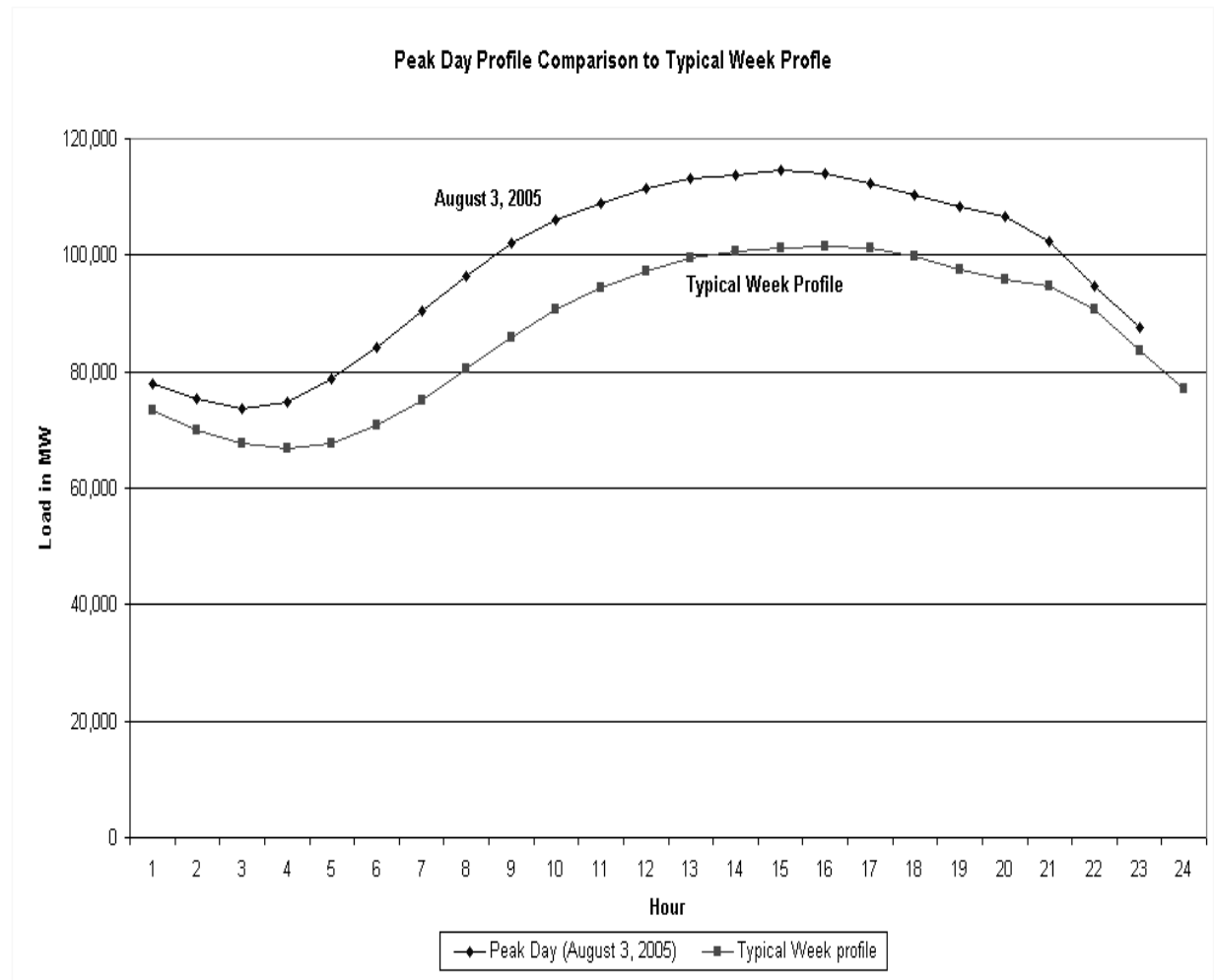
Making Sure Markets Are Competitive

- **How can you tell if there is too much control in the hands of a single company?**
 - Can a firm raise its prices above the competitive level?
 - Does a single provider have an unfair advantage in providing service to a specific area?
 - Are there few enough firms that would make it possible for them to collude to fix prices or limit production?
- **Are there effective “policing” and monitoring to prevent market power abuse?**
- **If abuse is detected, is there authority to effectively penalize the guilty parties?**
- **Is it possible to develop benchmarks to determine if specific mergers or acquisitions will create unfair advantages?**
- **Is it possible to develop benchmarks to determine if affiliates of energy companies have an unfair advantage?**



IMPROVEMENTS IN WHOLESALE MARKETS WILL MAKE ENHANCE RETAIL REGUATION

- Better Wholesale Power Markets will improve Retail Energy Markets.



In The End, How Do We Best Serve The Public Interest

- In the end, what matters is the end not how we got there.

