

PERFORMANCE METRICS: ENSURING FORWARD MOVEMENT IN RESTRUCTURED MARKETS

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Looking Back to Look Forward: The World Before Restructuring





**“We’re Mad as Hell
and We’re Not Going
to Take It Anymore!”**

At the Wholesale Level...

- Transmission access
 - Negotiation of “wheeling rights”
 - Discriminatory treatment
 - Lengthy litigation: “*Refunds to a Corpse*”
- Build-out costs
- “Reliability” and “native load” as code
- *TLRs, demand ratchets, price squeeze you name it...*

At the Retail Level...

- Rates significantly above the national average
- Industrial subsidies for public interest programs
- Investment stagnation
- Hit to global competitiveness

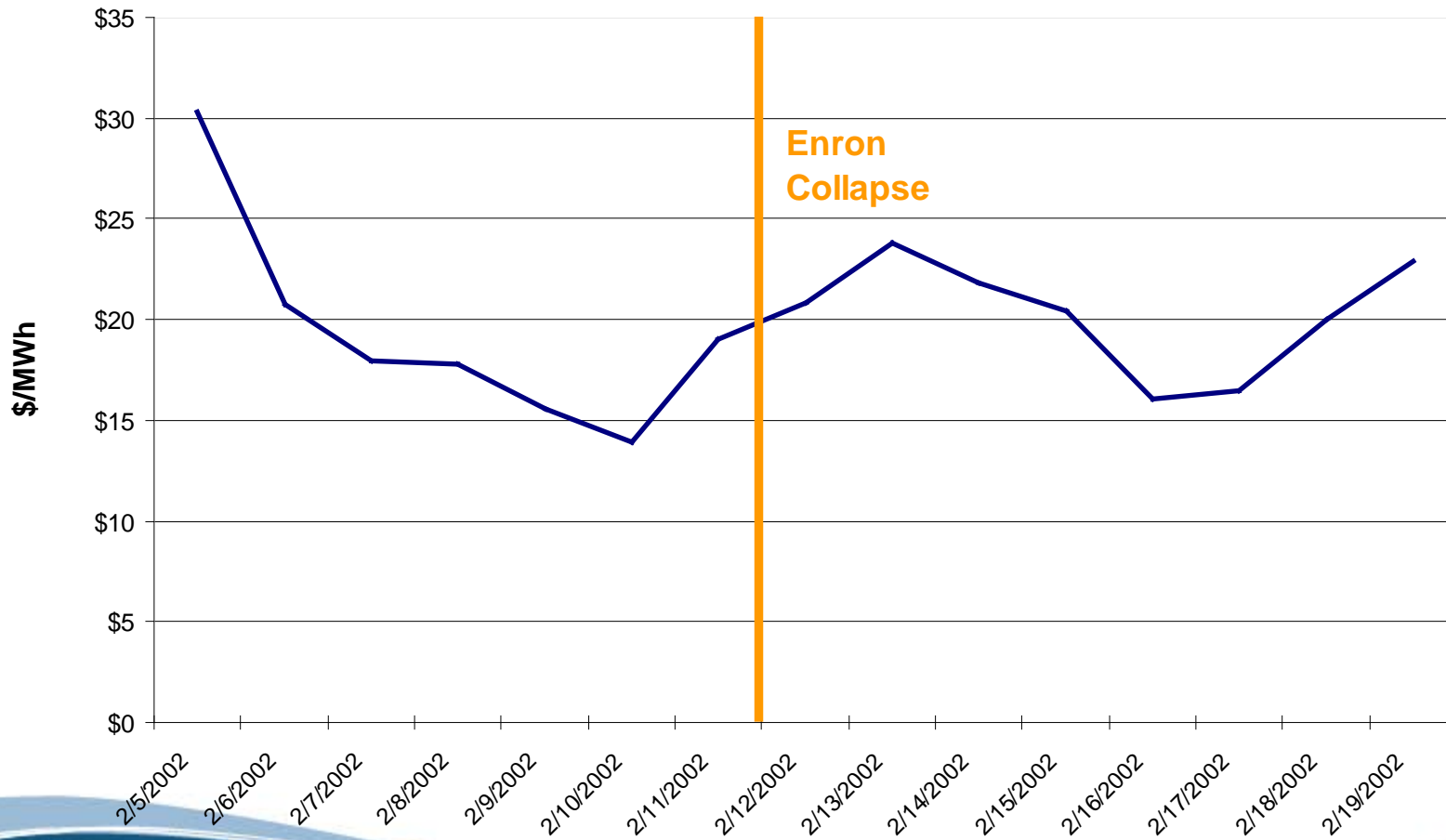
- Reminding the Regulator What We Got Right: *Measuring our collective accomplishments*
- Building on Past Experience: *Learning What Needs Further Work*
- Avoiding the Quagmire of Inaction

Report Card	
_____	A
_____	B
_____	I
_____	A
_____	C

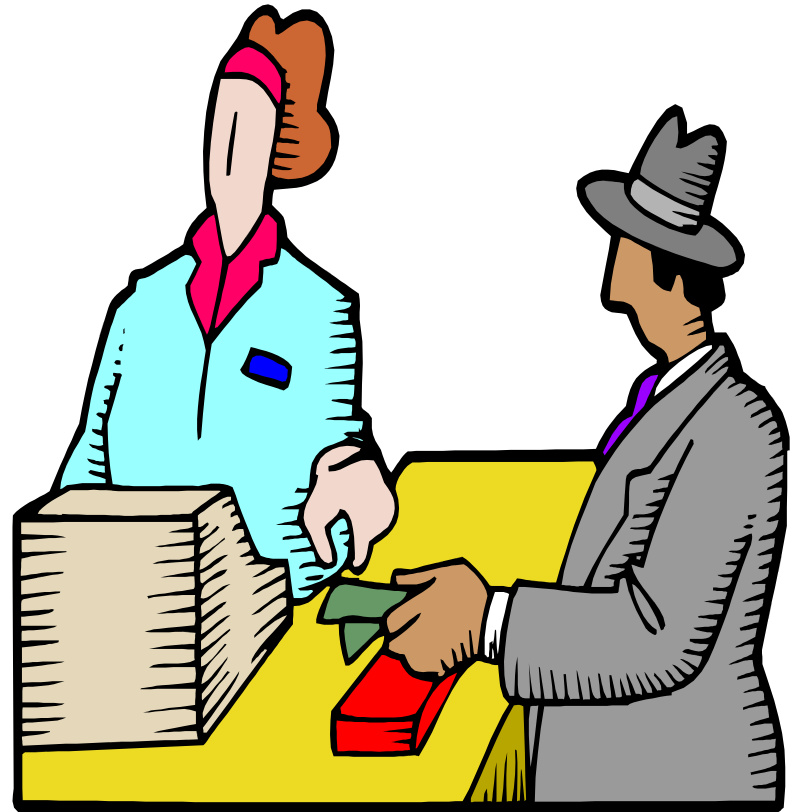
Accomplishment No. 1:

We moved the risk allocation formula:
aka “There was no Enron rate case!”

Mean PJM RTO LMP



- Consumers are paying for higher commodity costs not “bail-outs”
- If anything, capacity prices too low
- Markets delivering signals: We need to react to them wisely



Entrepreneurial New Entrants:

- Energy Storage
- Renewable Technology
- Frequency Response
- Smart Grid
- Batteries
- Demand Response and Energy Efficiency



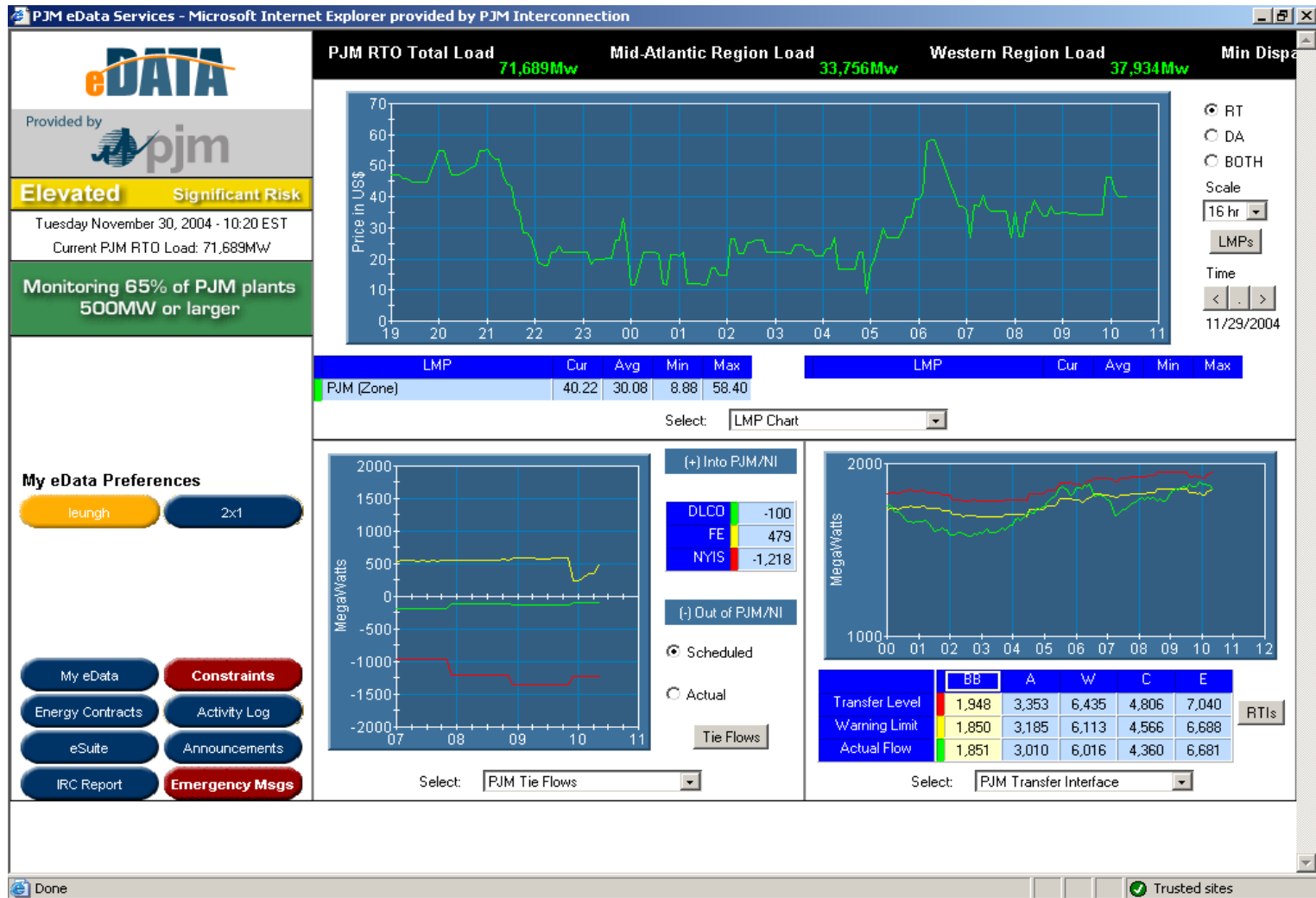
Accomplishment No. 2:

We got the fundamentals right!



- Regulatory solutions: Order 436, FCC Carterphone Decision
- Behavioral solutions: Order 436, Telecomm Act of 1992
- Structural solutions: Order 636, AT&T Divestiture

- Structural Solutions Have Worked
 - Eliminating multiple control areas
 - Regional planning
 - Redispatch in lieu of TLRs
 - Maximizing use of the Grid
 - Allowing customers to make economic decisions
 - Transparency



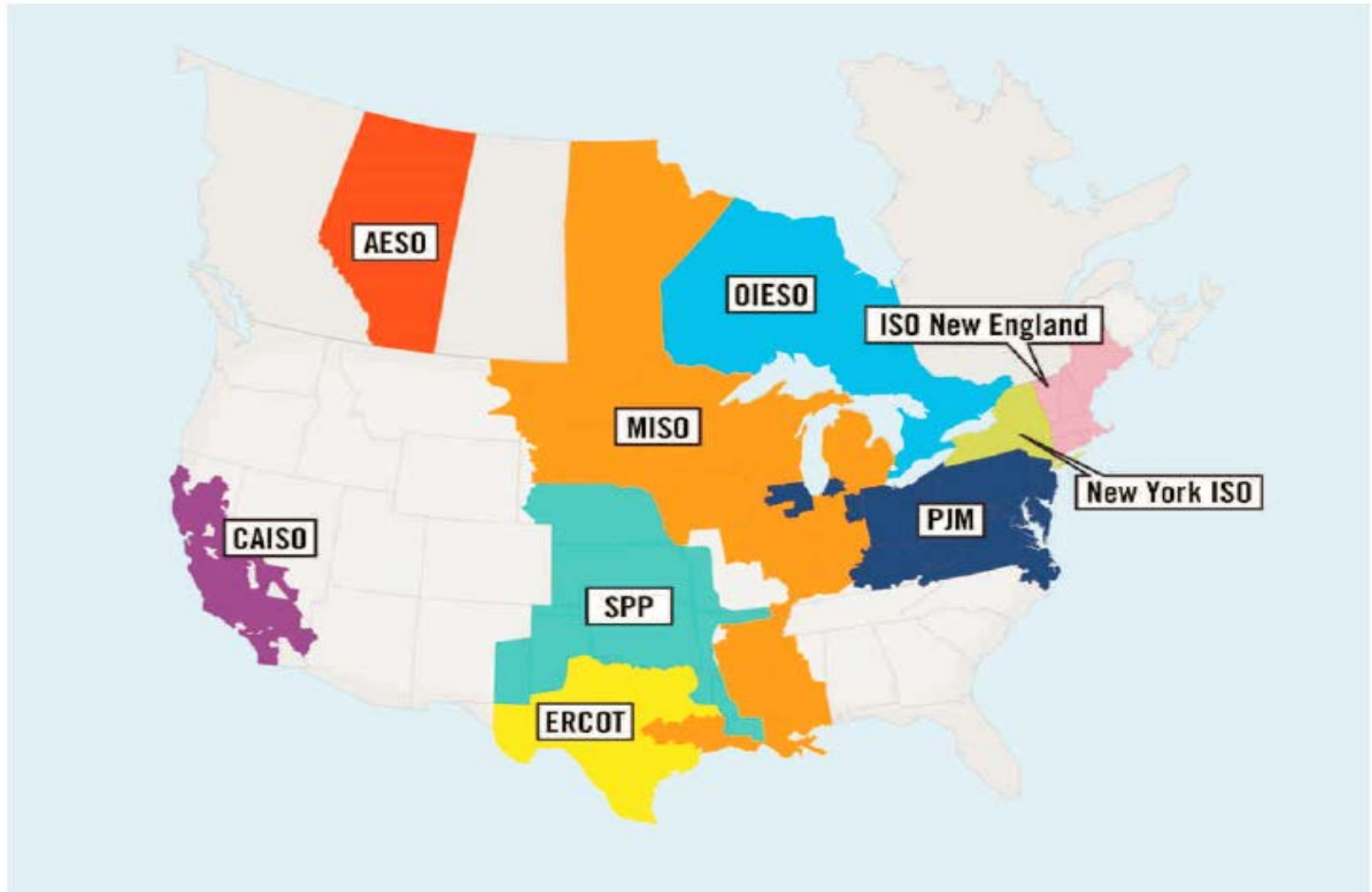


KEY STATISTICS

PJM member companies	900+
millions of people served	61
peak load in megawatts	165,492
MW of generating capacity	183,604
miles of transmission lines	62,556
2013 <u>GWh</u> of annual energy	791,089
generation sources	1,376
square miles of territory	243,417
area served	13 states + DC

**21% of U.S. GDP
produced in PJM**

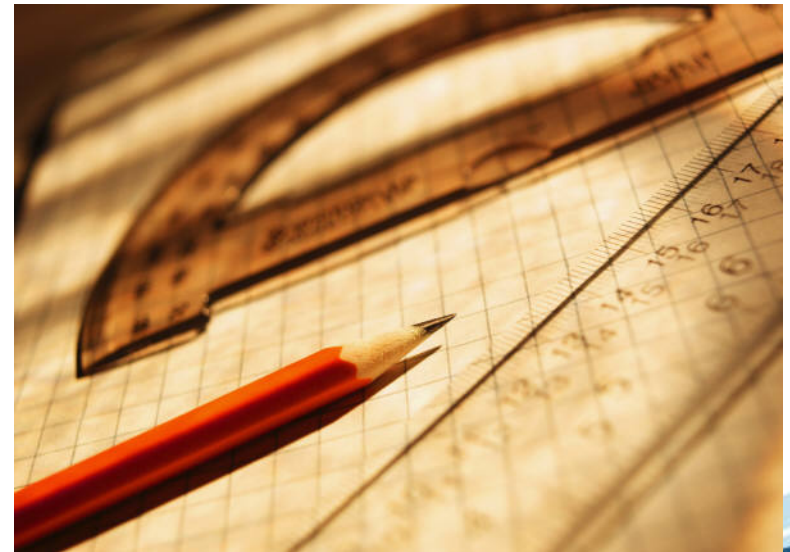
As of 4/1/2014



As of 4/1/2014

The Role of Quantitative Metrics:

- Demonstrating results
- Identifying areas of improvement
- Comparability of results across regions



- Measures of Customer Benefit:
 - Value Proposition metrics (RTO-Initiated)
- Measures of Market Outcomes:
 - Competitiveness metrics (FERC-Initiated)
- System Operator Performance Metrics (FERC-Initiated):
 - Reliability
 - Planning
 - Markets
 - Customer Satisfaction



Measures of Customer Benefits: The RTO Value Proposition

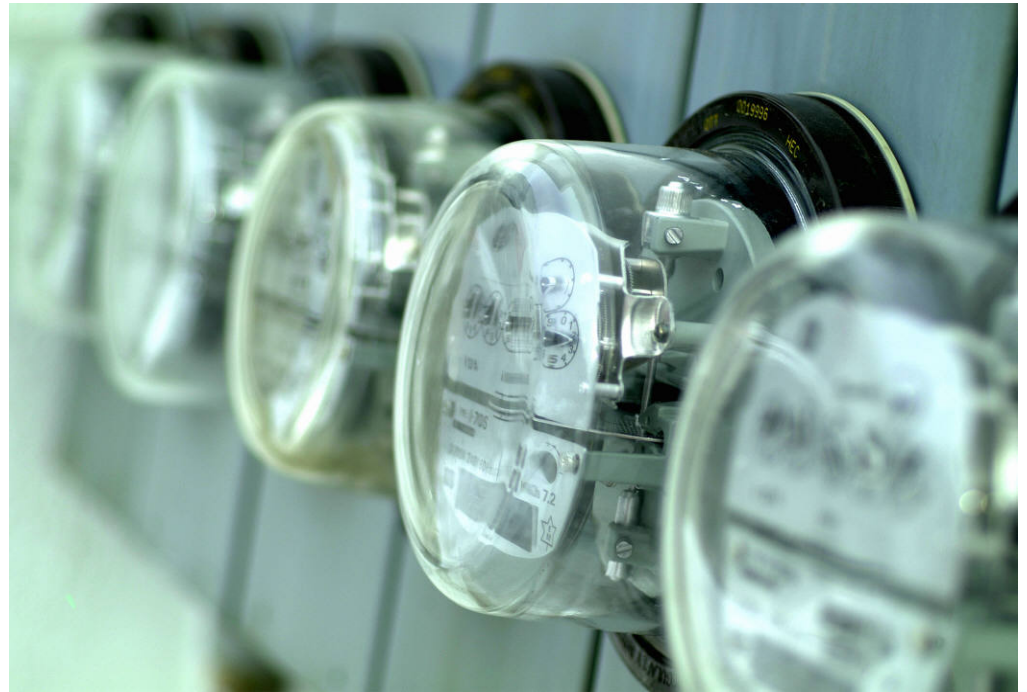
- Reliability Savings – Redispatch rather than curtailment to address transmission constraints:
Estimated Savings \$ 78 - \$ 98M US
- Regional Planning – Devising region-wide solutions for market efficiency, reliability and public policy:
Estimated Savings \$ 390M US



- Measuring the Value of Bid-Based Dispatch
 - Energy Production Savings: \$ 340 to \$ 445M US
 - Market-based Provision of Ancillary Services:
\$ 80 to \$ 105M US
- Competitive Forces in the Supply of Capacity
 - Savings: \$ 366M to \$ 900M US



Demand Response and Energy Efficiency Integrated Into the Market: \$ 275M US



Market Outcome Measures

Competitiveness Metrics (FERC-initiated)



Measures of Market Competitiveness

- Market Concentration: HHI, 3 Pivotal Supplier
- Mark-up: Prices Exceeding Marginal Costs
- Market Convergence: Day Ahead vs. Real Time – Building system conditions into price



- Net Revenue Adequacy: Measure of markets covering generator fixed costs by unit type for the marginal units
 - Net Revenue Adequacy for new units
 - Net Revenue Adequacy fleet-wide
- Unit Efficiency:
 - Heat Rate Improvement



RTO Metrics Report to FERC

Reliability Metrics Reported

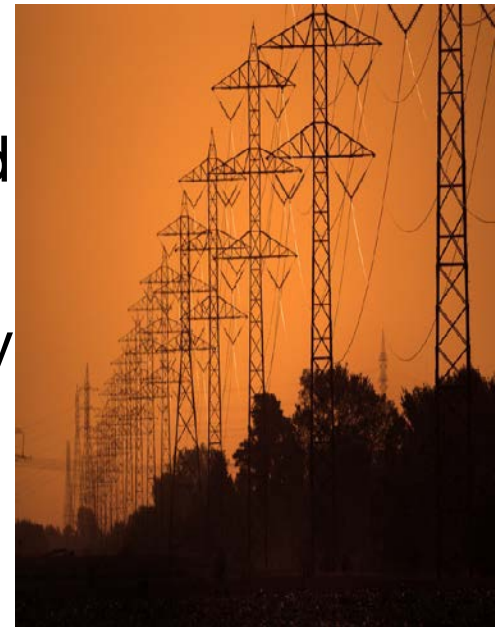


- Maintenance and timely restoration of frequency
- Curtailment of transactions — TLRs
- Load Forecast Accuracy — Mean Absolute Percentage Error — Deviations
- Loop Flow
- Level of Unplanned Transmission Outages
- Generator Forced outage rates
- Generator Interconnection Processing Time

RTO Metrics Report to FERC

Market Results Reported

- Out of Market Arrangements: Extent of out of market RMR Contracts
- Prices: Fuel adjusted prices
- Congestion Costs: Hedged and unhedged
- Generator availability
- Renewable capacity as % of total capacity



RTO Metrics Report to FERC

Institutional Effectiveness

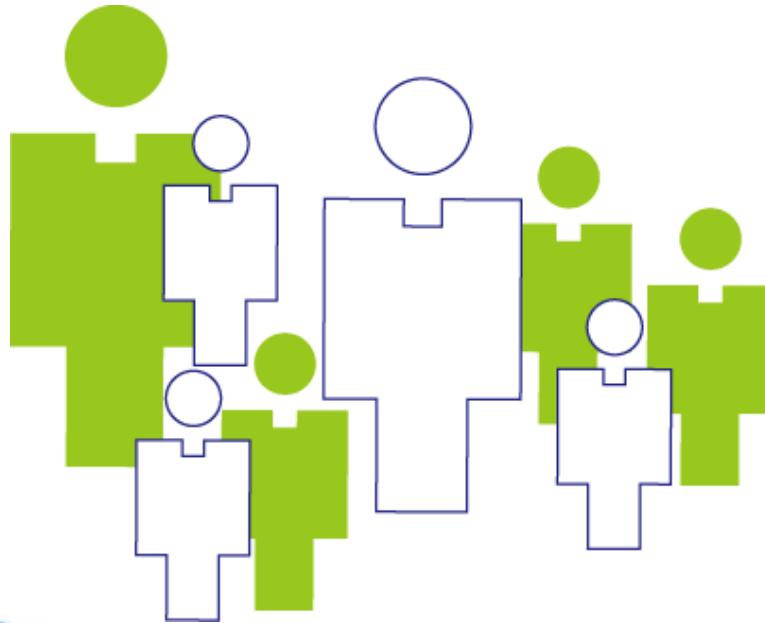
- RTO administrative costs
- Customer satisfaction
- Audit results



“Hanging in mid-air”: a dangerous place



- A restructured industry or “Golden memories of yesteryear...”
 - The choice is ours



LET'S TALK...



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