

# **CROSS BORDER COORDINATION: PJM AND MISO**

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***Competition and Coordination in the Electricity Industry***

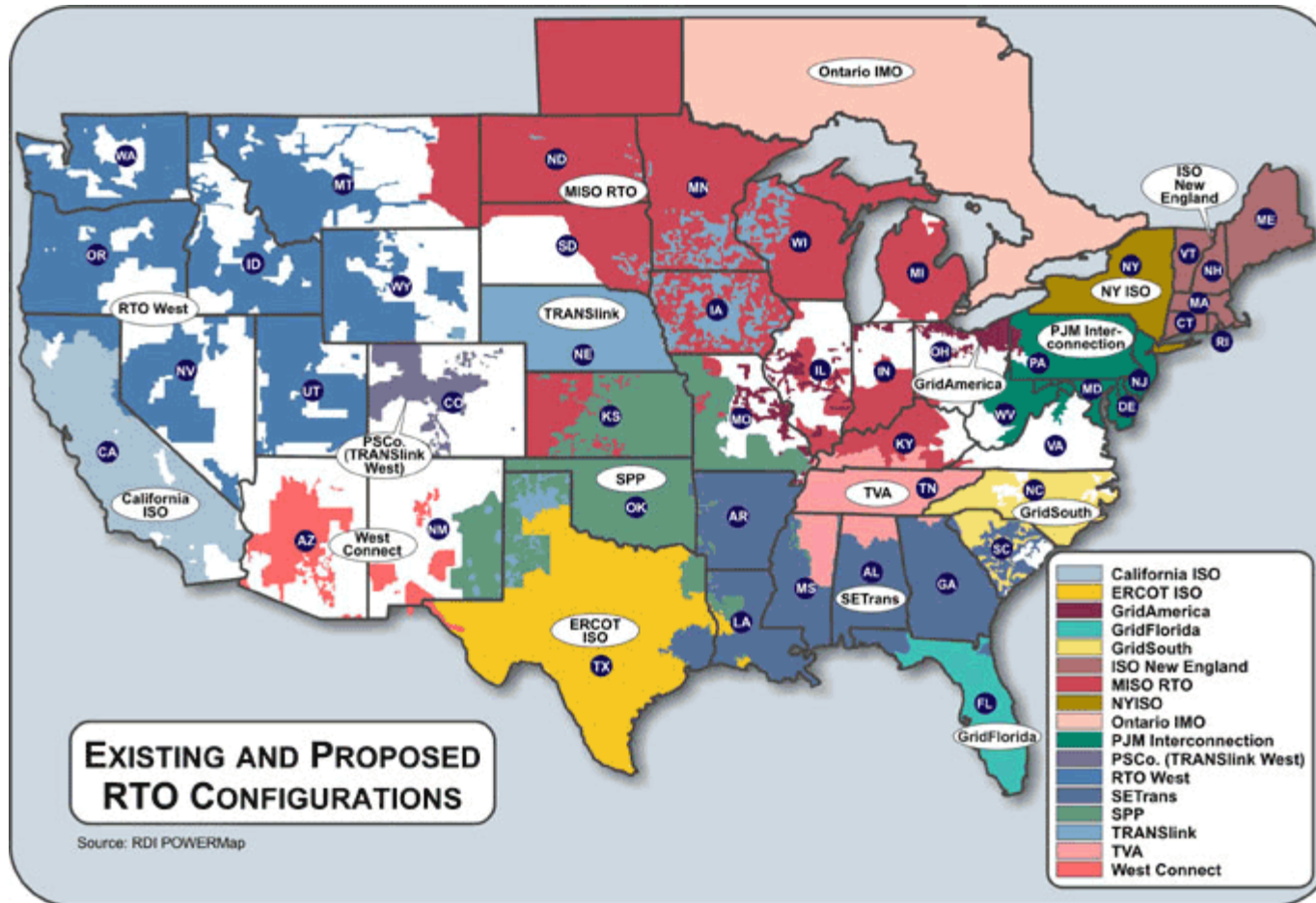
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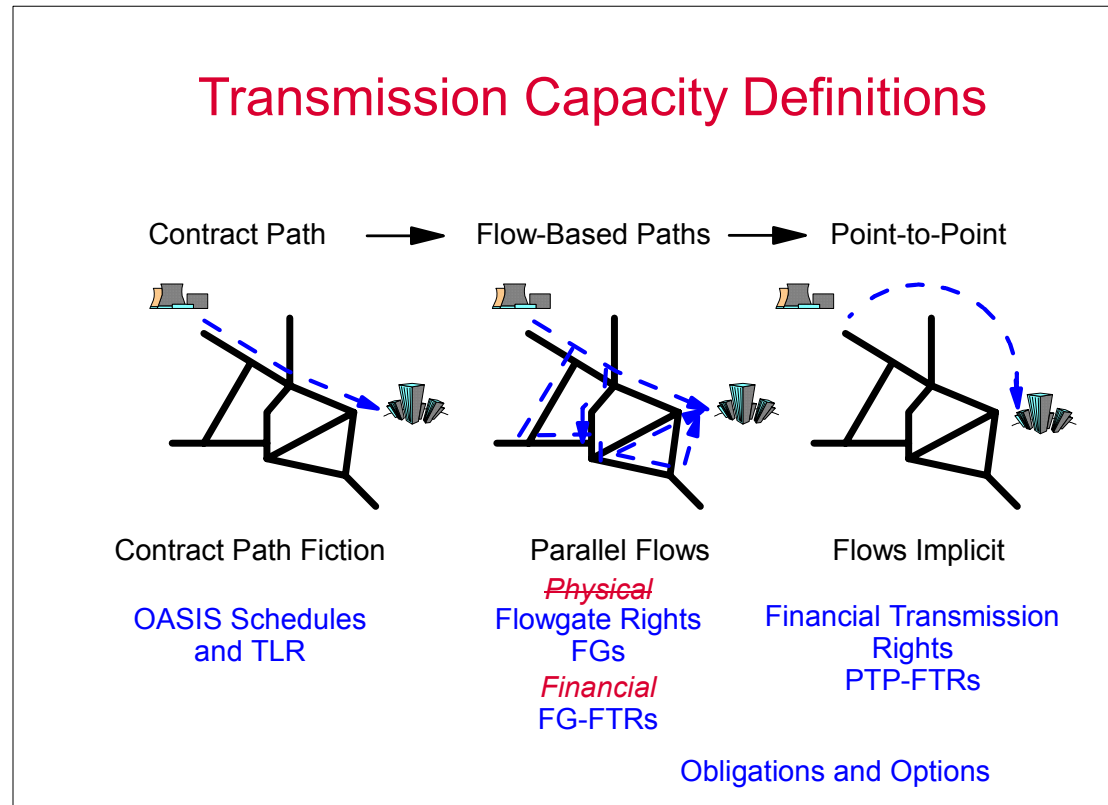
# TRANSMISSION COORDINATION

# Cross Border Transactions

The developing Regional Transmission Organizations in the United States are a response to the need for coordination, within regions and across “seams.” (FERC RTO web page)



Conventional definitions of transmission contract paths differ sharply from the flows on the network.



# TRANSMISSION TRANSACTIONS

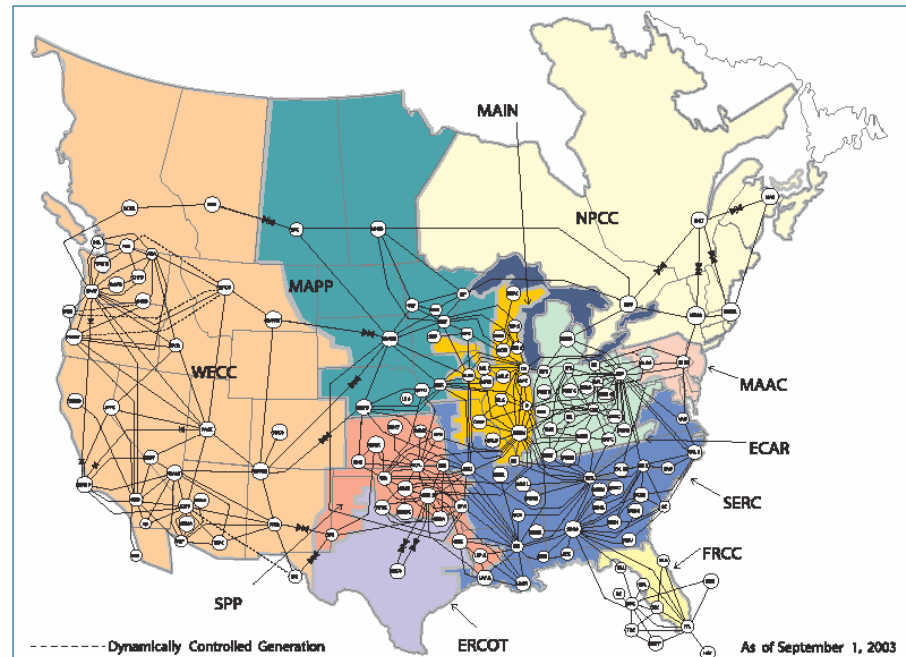
# Transmission Loading Relief

The first model is transmission loading relief (TLR). The TLR protocols focus on transactions between control areas.

## TLR Features

- **Necessary.** Contract path scheduling required an immediate un-scheduling mechanism to protect reliability.
- **Large Curtailments.** Transactions cut across the board.
- **Non-market.** Does not consider market value or manage economic redispatch.
- **Granularity.** Does not track transactions within control areas.
- **Complex.** Communication and decision cycle is slow and adjustments are not well suited for addressing multiple constraints.

Figure 2.6. NERC Regions and Control Areas

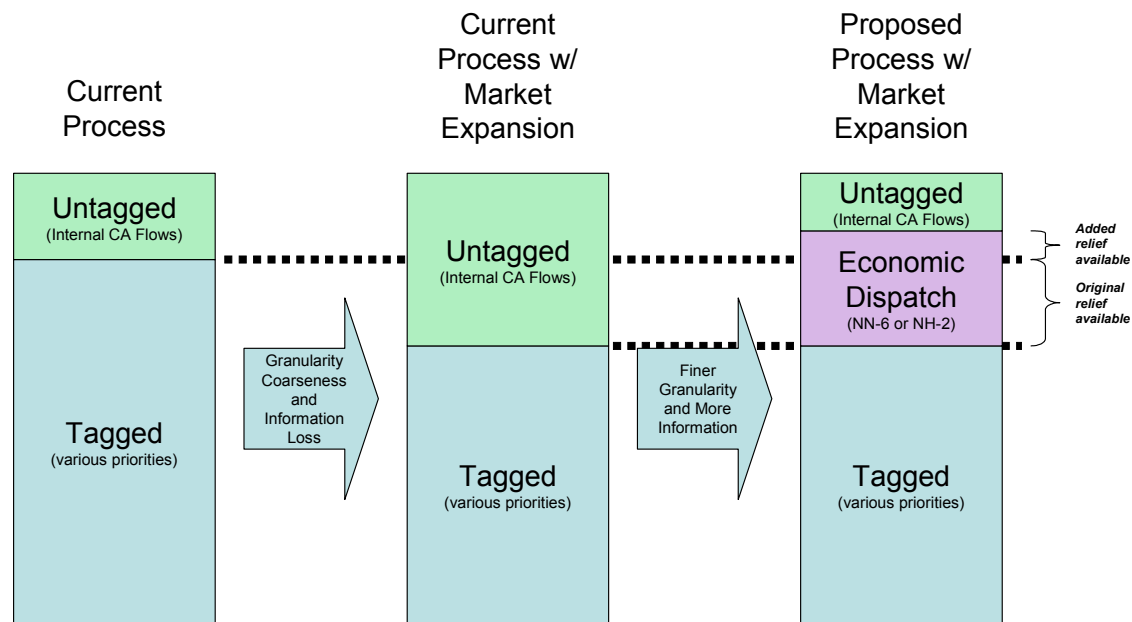


(Graphic: US-Canada Power System Outage Task Force. "Interim Report: Causes of the August 14th Blackout in the United States and Canada," November 2003, p. 9.)

# TRANSACTION TAGGING

# Granularity

Expansion of RTO regions would reduce granularity. The second model for “market-to-non-market” coordination by PJM and MISO calls for ISO to track “flowgate” effects of internal economic dispatch.



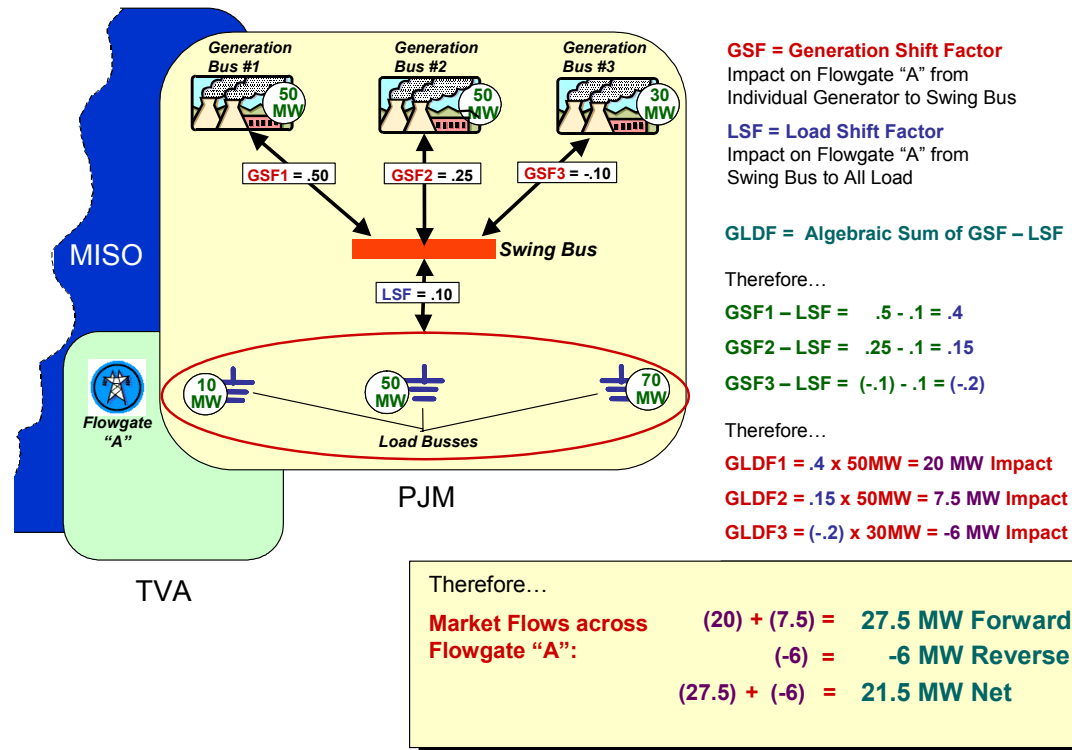
(PJM-MISO “Managing Congestion to Address Seams,” August 2, 2003, p 14.)

# MARKET FLOW CALCULATIONS

# Loop Flow

The impact calculations for internal schedules recognize the external effects on third parties.

## Calculating the Market Flow Illustration

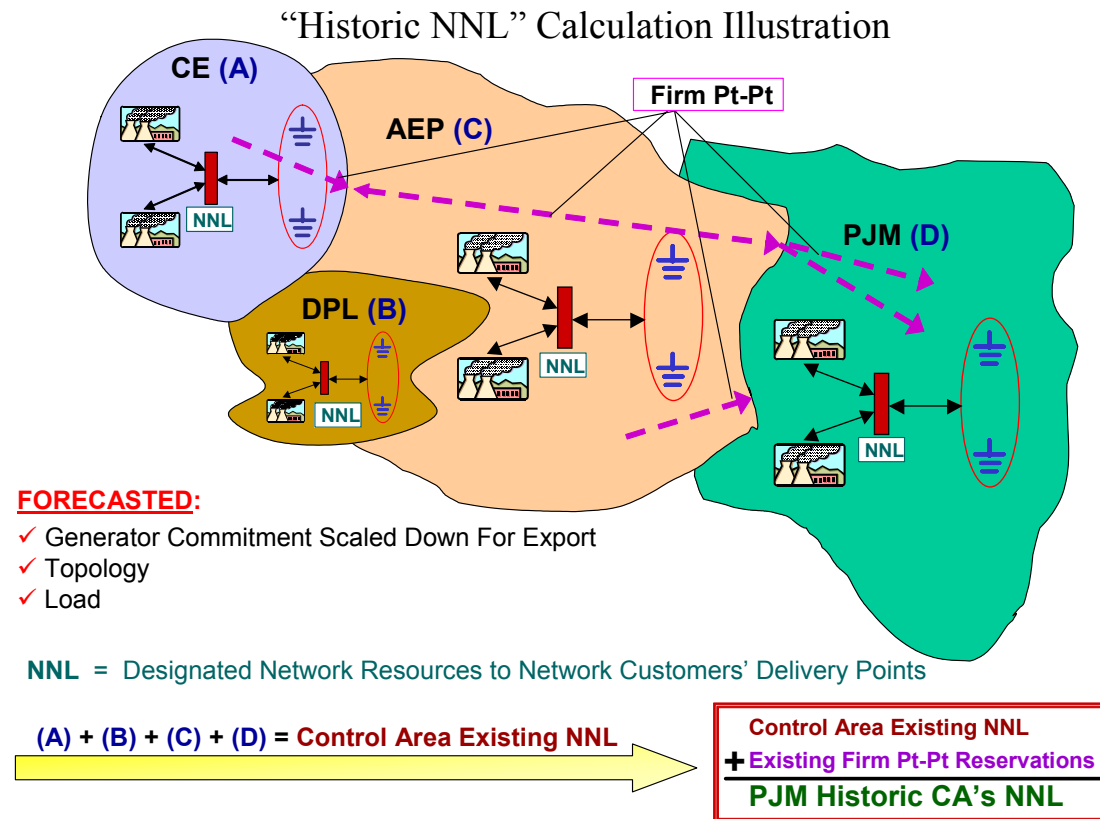


(PJM-MISO "Managing Congestion to Address Seams," August 2, 2003, p 20.)

# PJM EXPANSION

# Network and Native Load

Network and Native Load (NNL) as well as firm point-to-point will be modeled and tracked for impacts on the hundreds of impacted flowgates or constraints.



(PJM-MISO “Managing Congestion to Address Seams,” August 2, 2003, p. 24.)

**PJM and the Midwest Independent System Operator (MISO) have developed a joint operating agreement to include coordination to address seams issues.**

“As PJM and MISO expand and implement their respective markets, one of the primary seams issues that must be resolved is how different congestion management methodologies (market-based and traditional) will interact to ensure that parallel flows and impacts are recognized and controlled in a manner that consistently ensures system reliability. ... PJM is a Market Based Operating Entity that plans to expand its area, and MISO is starting its Market Operations and is becoming a Market-Based Operating Entity. In brief, the proposal includes the following concepts:

- Market-Based Operating Entities will agree to observe limits on an extensive list of coordinated external flowgates
- Like all control areas, Market-Based Operating Entities will have Network and Native Load (NNL) impacts upon those flowgates.
- Market-Based Operating Entities will determine these NNL impacts using the published analysis process, and constrain their operations to limit firm flows on the Coordinated Flowgates to no more than the calculated NNL contribution established in the analysis.
- In real-time, Market-Based Operating Entities will calculate and monitor when the projected and actual flows exceed the NNL limits established in the day-ahead process. ...
- The complete proposal will allow Market-Based Operating Entities to address the reliability aspects of congestion management seams issues between all parties whether the seams are between market to non-market operations or market to market operations.”

(PJM-MISO “Managing Congestion to Address Seams,” August 2, 2003., pp. 3-4)



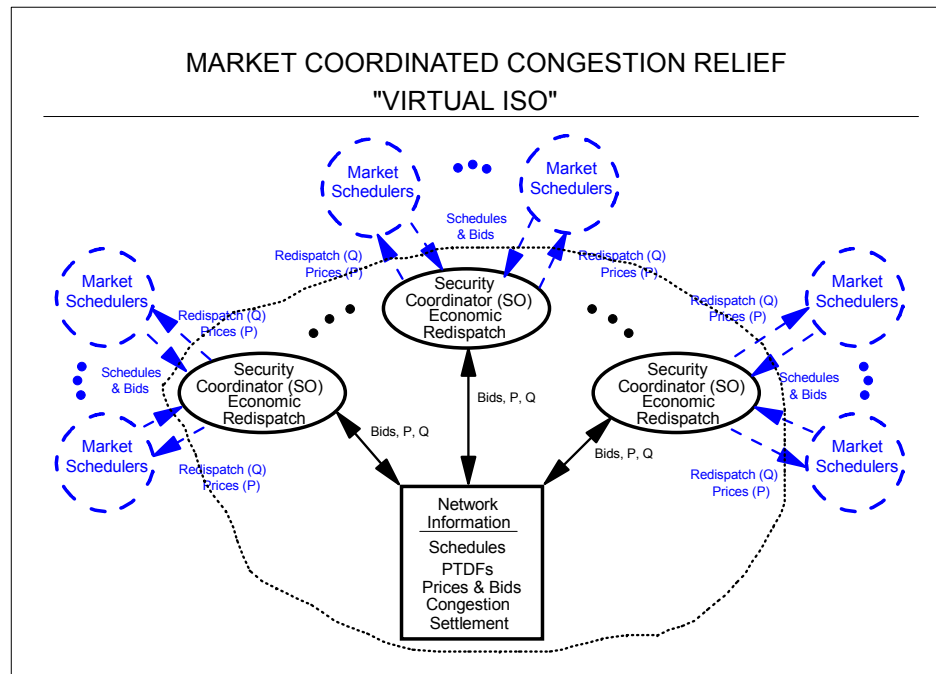
# MARKET INTEGRATION

# Virtual ISOs

The anticipated “market-to-market” design would extend existing within market coordination to create a common integrated dispatch.

“MISO and PJM will utilize this recalculation process annually until it is replaced by another process. It is anticipated that an enhanced, market-to-market, process will be developed to replace the Historic NNL calculation process. The enhanced process may use a simultaneous deliverability type analysis rather than the historic NNL calculation process.” (PJM-MISO “Managing Congestion to Address Seams,” August 2, 2003, p. 26-27.)

PJM currently coordinates separate control areas in PJM West and PJM “Classic” but through a common dispatch and pricing system. This model includes full simultaneous feasibility, bilateral scheduling, economic dispatch for the balancing market, locational pricing and use of financial transmission rights.



William W. Hogan is the Lucius N. Littauer Professor of Public Policy and Administration, John F. Kennedy School of Government, Harvard University and a Director of LECG, LLC. This paper draws on work for the Harvard Electricity Policy Group and the Harvard-Japan Project on Energy and the Environment. The author is or has been a consultant on electric market reform and transmission issues for Allegheny Electric Global Market, American Electric Power, American National Power, Australian Gas Light Company, Avista Energy, Brazil Power Exchange Administrator (ASMAE), British National Grid Company, California Independent Energy Producers Association, Calpine Corporation, Central Maine Power Company, Comision Reguladora De Energia (CRE, Mexico), Commonwealth Edison Company, Conectiv, Constellation Power Source, Coral Power, Detroit Edison Company, Duquesne Light Company, Dynegy, Edison Electric Institute, Edison Mission Energy, Electricity Corporation of New Zealand, Electric Power Supply Association, El Paso Electric, GPU Inc. (and the Supporting Companies of PJM), GPU PowerNet Pty Ltd., GWF Energy, Independent Energy Producers Assn, ISO New England, Maine Public Advocate, Maine Public Utilities Commission, Midwest ISO, Mirant Corporation, Morgan Stanley Capital Group, National Independent Energy Producers, New England Power Company, New York Independent System Operator, New York Power Pool, New York Utilities Collaborative, Niagara Mohawk Corporation, NRG Energy, Inc., Ontario IMO, Pepco, Pinpoint Power, PJM Office of Interconnection, PP&L, Public Service Electric & Gas Company, Reliant Energy, Rhode Island Public Utilities Commission, San Diego Gas & Electric Corporation, Sempra Energy, SPP, Texas Utilities Co, TransÉnergie, Transpower of New Zealand, Westbrook Power, Williams Energy Group, and Wisconsin Electric Power Company. The views presented here are not necessarily attributable to any of those mentioned, and any remaining errors are solely the responsibility of the author. (Related papers can be found on the web at [www.whogan.com](http://www.whogan.com)).