

NY Wholesale Electricity Markets & the Effect of RGGI on Imports

James T. Gallagher

*Senior Manager, Strategic & Business Planning
New York Independent System Operator*

**RGGI Inc.: Learning Session on Electricity Markets
and Electricity Imports**

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The Roles of the NYISO



Reliable operation of the bulk electricity grid

- *Managing the flow of power nearly 11,000 circuit-miles of transmission lines from more than 300 generating units*



Administration of open and competitive wholesale electricity markets

- *Bringing together buyers and sellers of energy and related products and services*



Planning for New York's energy future

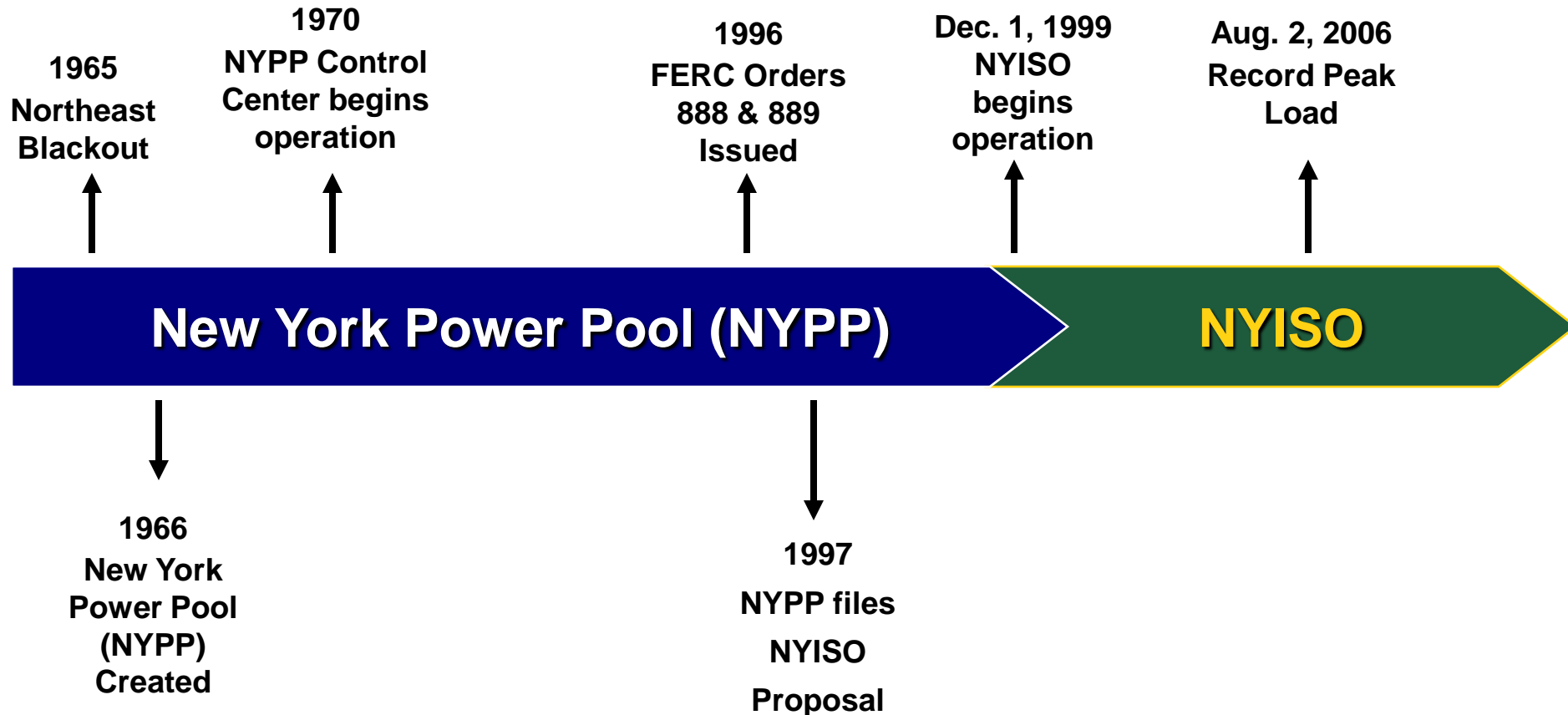
- *Assessing needs over a 10-year horizon and evaluating the feasibility of projects proposed to meet those needs*



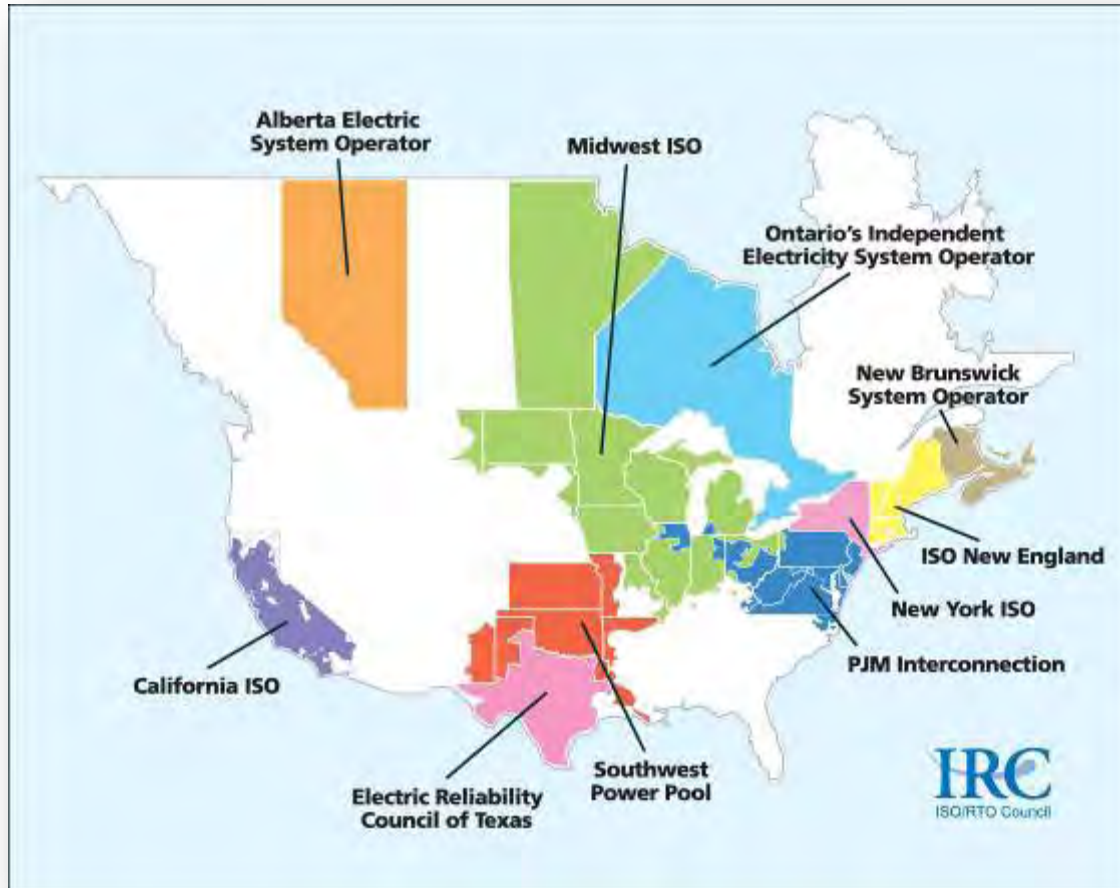
Advancing the technological infrastructure of the electric system

- *Developing and deploying information technology and tools to make the grid smarter*

Evolution of the NYISO



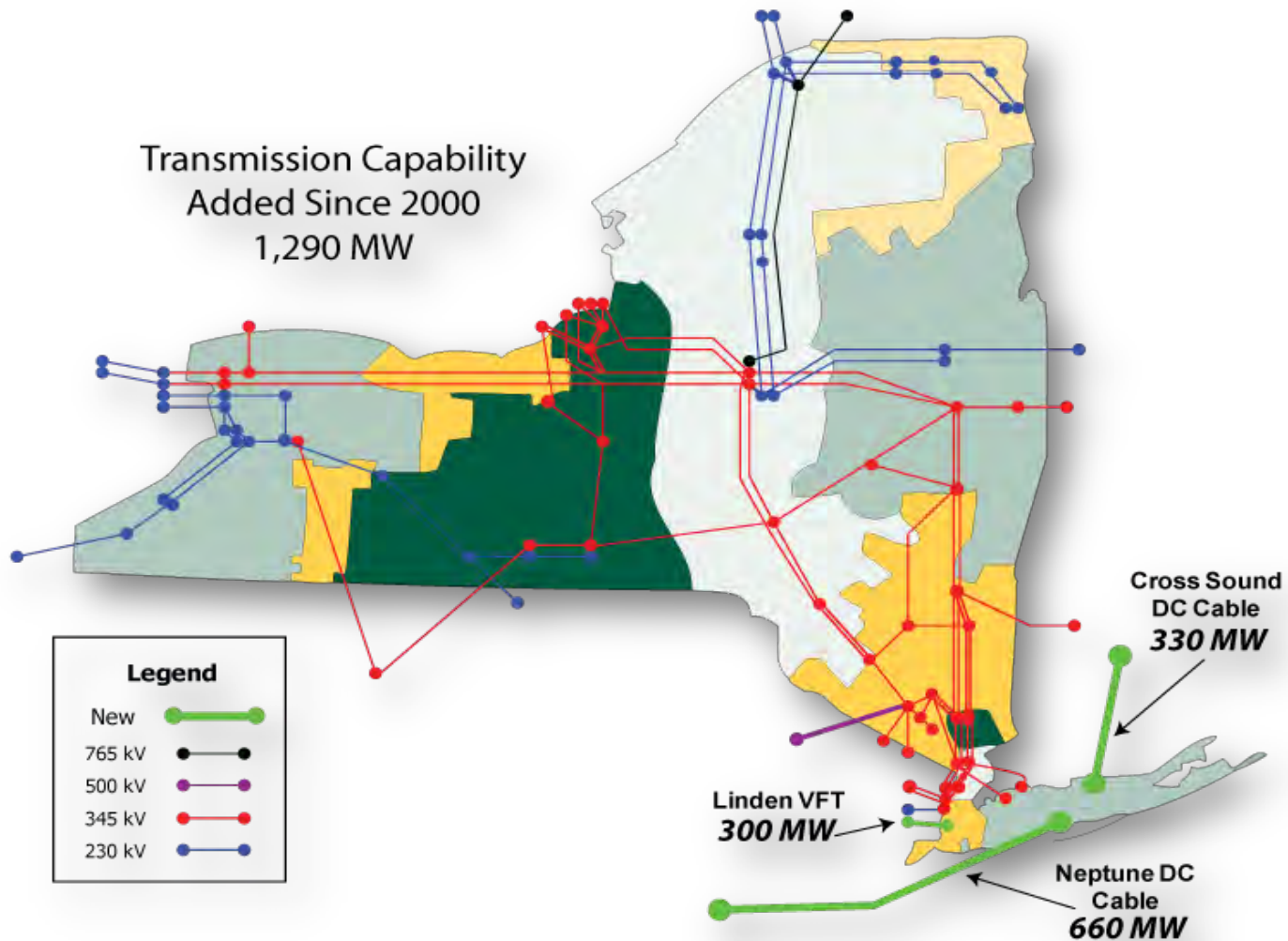
ISOs & RTOs



There are now 10 Independent System Operators and Regional Transmission Organizations (ISO/RTOs) in North America.

They serve two-thirds of electricity consumers in the United States and more than one-half of Canada's population.

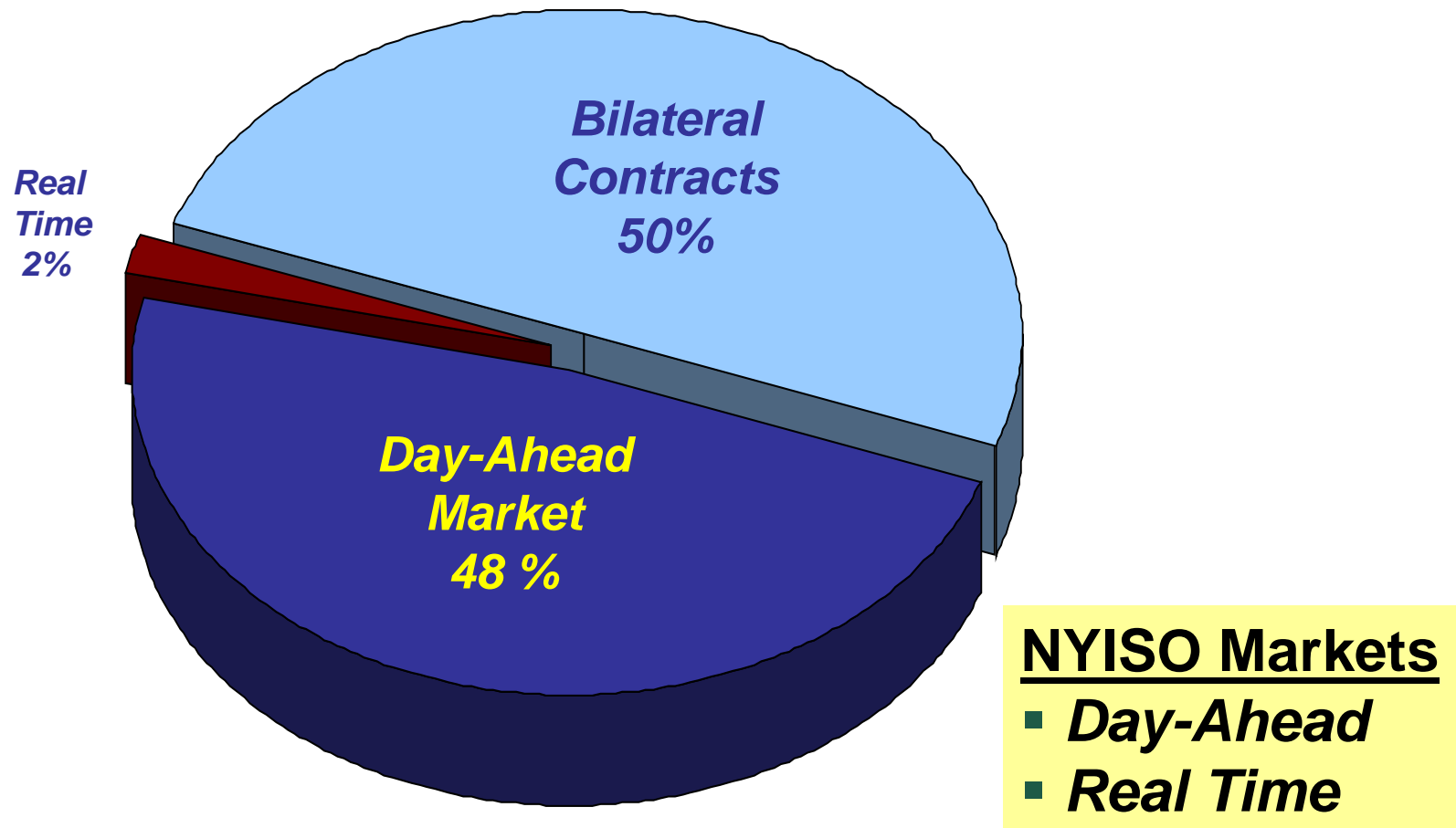
Transmission



Day-Ahead & Real-Time Markets

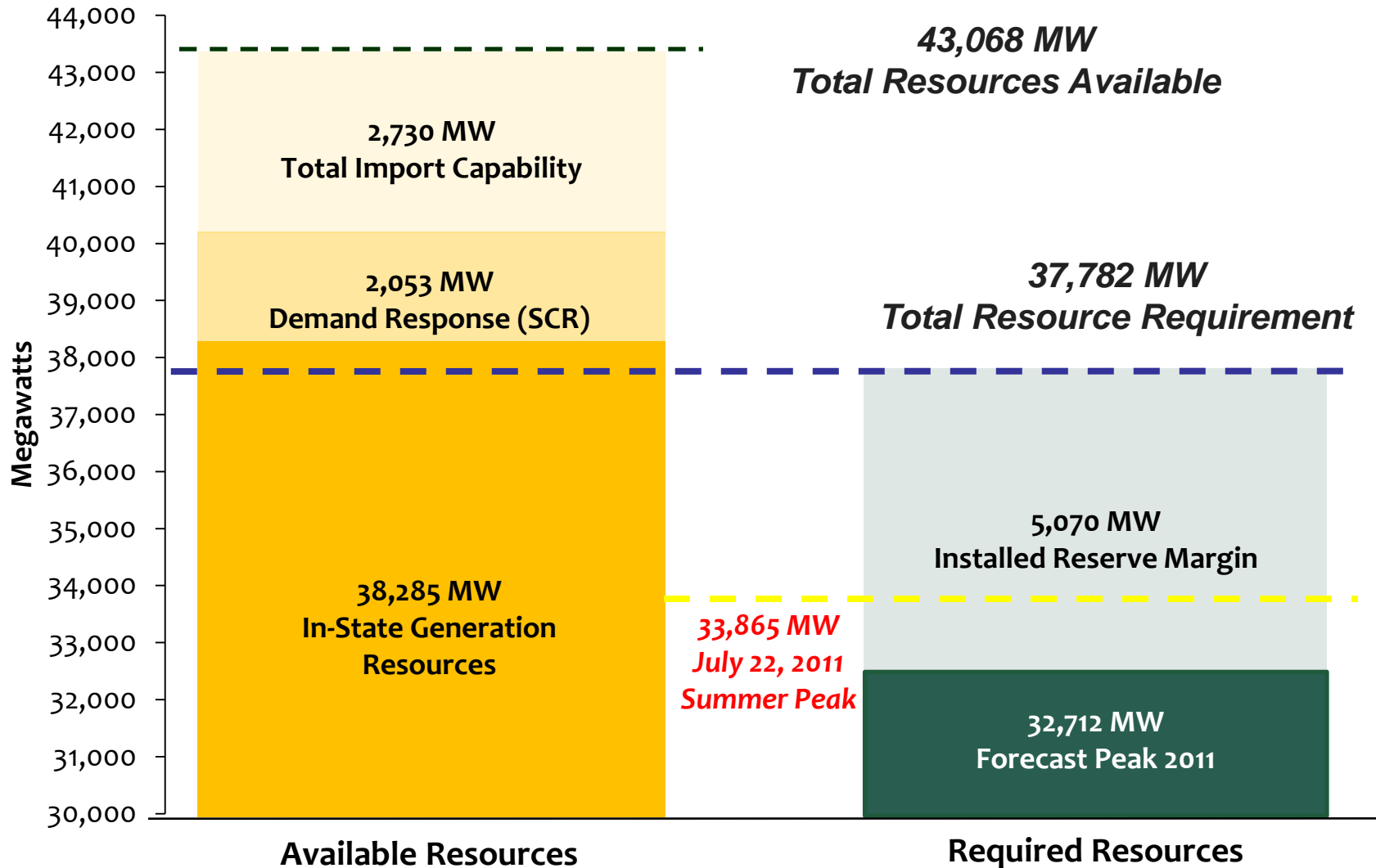
- ◆ **Full two-settlement Locational Based Marginal Price (“LBMP”) market for Energy and Reserves**
 - *Forward and Real-Time Markets*
 - *Co-optimization of Energy, Interchange, Operating Reserves and Regulation*
 - **Bid Based Security-Constrained Economic Dispatch (SCED) and Commitment (SCUC)**
 - *Shortage pricing for operating reserves*
 - *Virtual Bidding*
 - *Demand Side Participation*
 - *Economic evaluation of intertie transactions*

NY's Wholesale Electricity Markets



Resource Availability

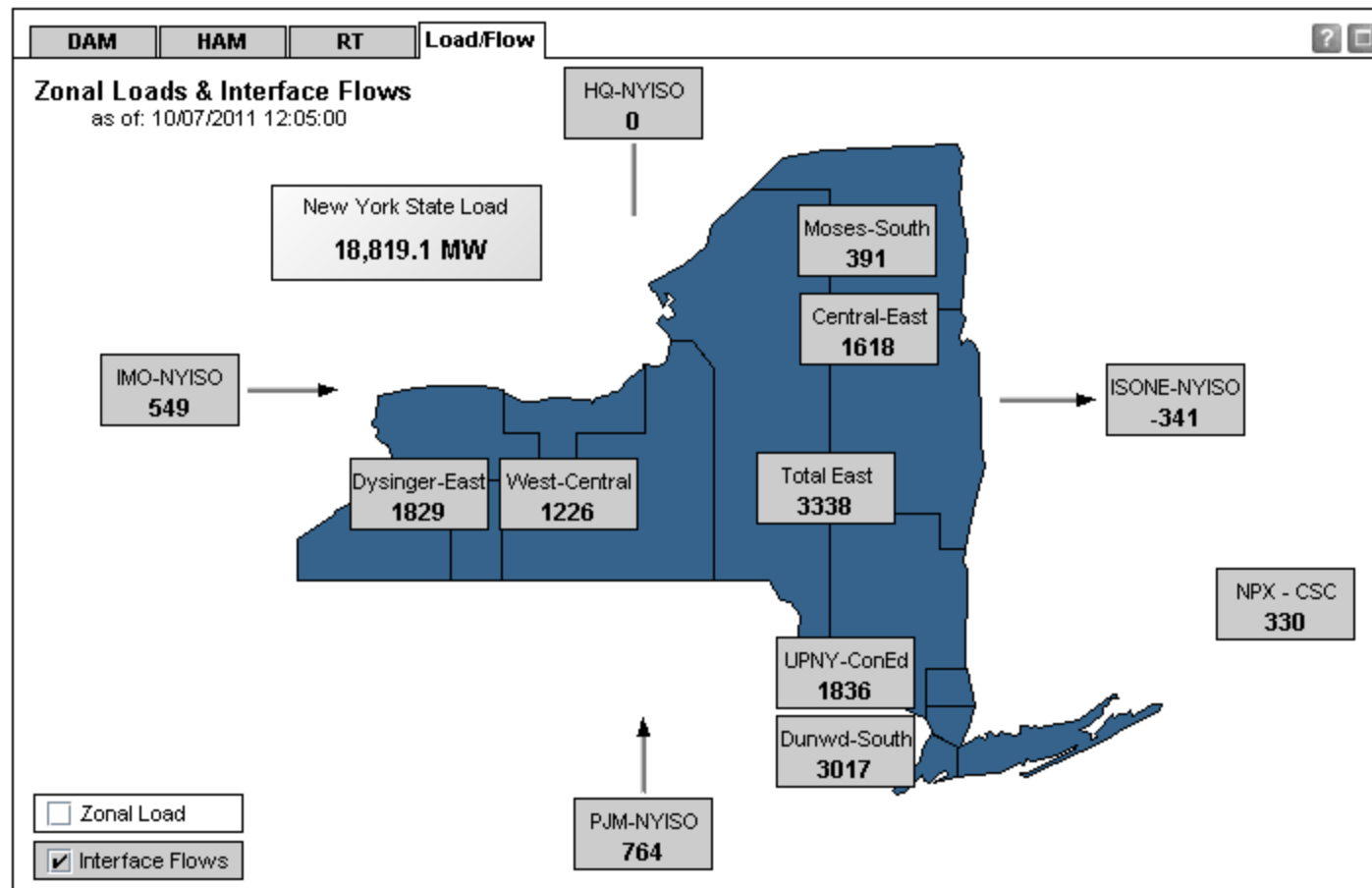
Summer 2011



NYISO External Transactions

- ◆ New York shares borders with ISO-NE, PJM, Ontario and Quebec
- ◆ Electric power may be scheduled as an import, export or wheel (through and out) transaction
- ◆ Imports, exports and wheels are economically evaluated as part of the Day-Ahead and Real-Time markets
 - *Example: Imports compete on price with internal generators to supply electric power in New York*

NYISO Load Flow



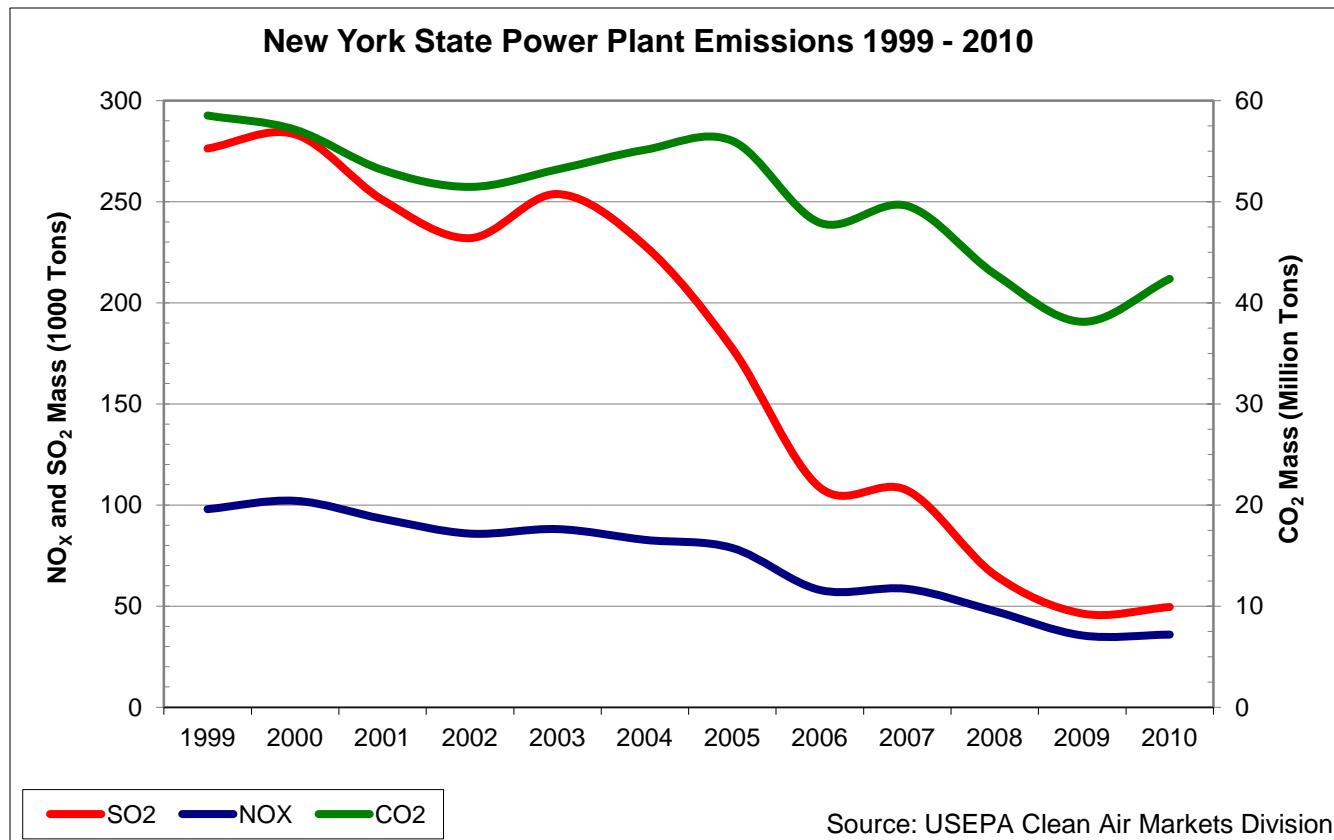
http://www.nyiso.com/public/markets_operations/market_data/maps/index.jsp

Benefits of Markets

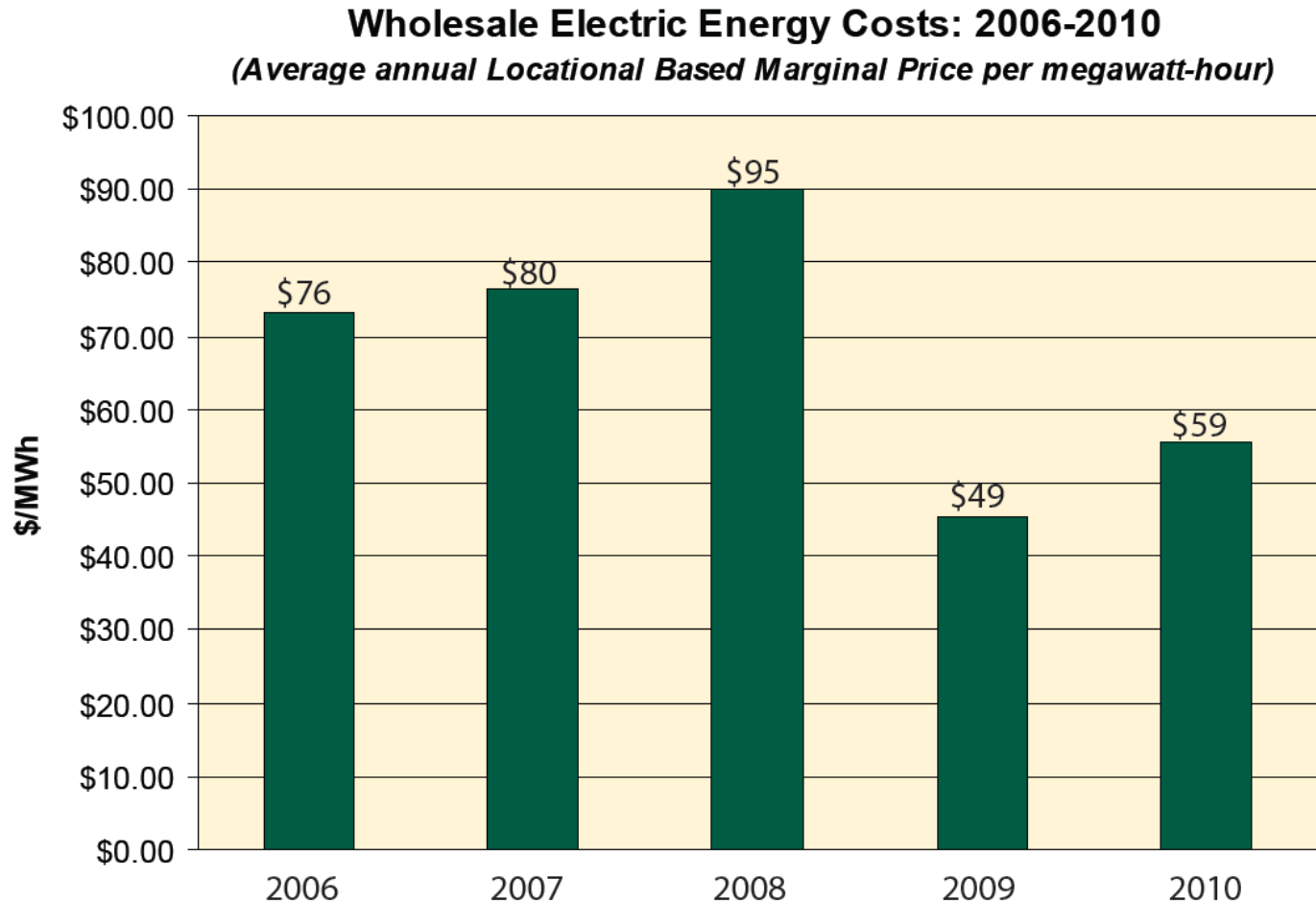
- ◆ The 2009 State Energy Plan, developed by the New York State Energy Planning Board, states:
 - *“New York’s competitive electricity market structure, established in 1999 and administered by the NYISO, provides an economic incentive to power plant operators to run as efficiently as possible.”*
 - *“More efficient, i.e., lower heat rate, resources are attracted to competitive markets where they can profit by competing against less efficient producers, an incentive that does not exist in non-market regions.”*

Environmental Benefits

- ◆ Cap and Trade programs and competition promote the dispatch of cleaner generation



Wholesale Energy Costs



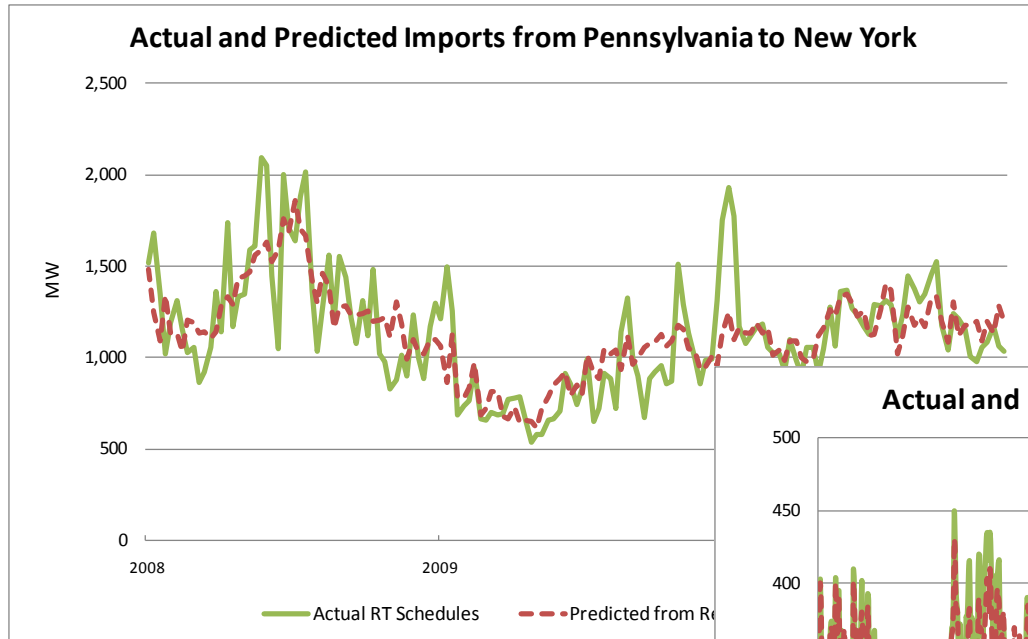
NYISO Leakage Study

- ◆ At the request of market participants NYISO tested the hypothesis that RGGI causes an increase in emissions from CO₂ emitting generators external from RGGI states (i.e. “leakage”)
- ◆ Econometric model tested for relationship between price of RGGI compliance and the quantity of imports and CO₂ emissions
 - *Higher imports or CO₂ from outside of RGGI would suggest that leakage was occurring*
 - *Study covers 1/2007 to 9/2010*

Explanatory Variables

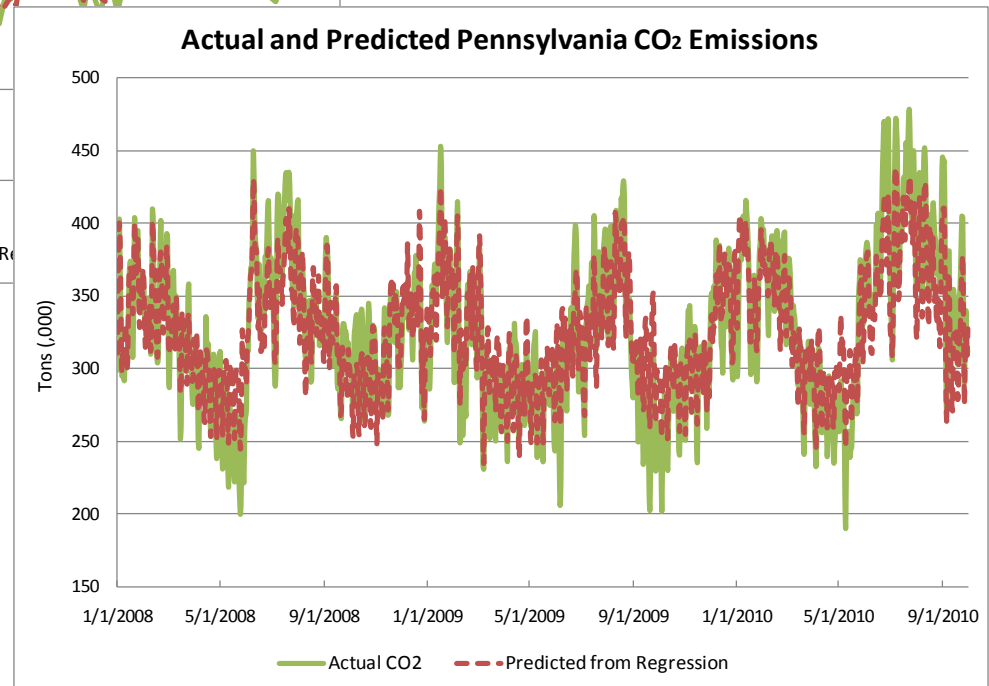
- ◆ The primary determinants of economic transactions for electric power are demand (load) and fuel prices
- ◆ Our model controlled for these factors and other explanatory variables, including:
 - *Output from non-emitting generators*
 - *Transactions with New England and Canada*
 - *EPA NO_x and SO₂*

Goodness of Fit



Variability in imports cannot be fully explained in the model as external transactions market lacks full price arbitrage

Better fit in CO₂ emission model, with load the most significant predictor



Results

- ◆ Load, day type, NO_x price, PA nuclear generation, and natural gas price were the statistically significant predictors of PA CO_2 emissions or power imports from PA to NY
- ◆ The price of RGGI compliance (the RGGI allowance price) did not have a statistically significant relationship with PA CO_2 emissions or with flow of power from PA to NY

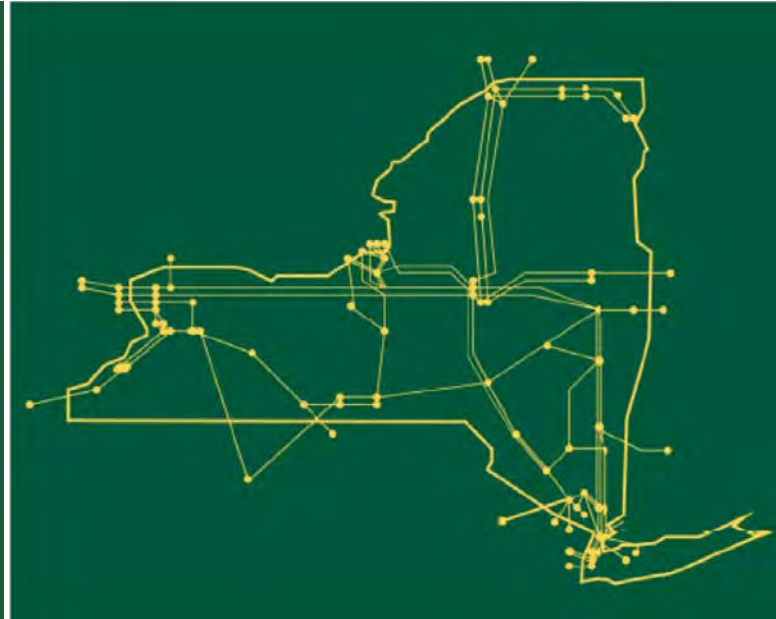
Conclusions

- ◆ The econometric analysis does not support the hypothesis that RGGI compliance has caused leakage, likely because:
 - *Magnitude of RGGI allowance prices has been low relative to the price of electricity*
 - *Large changes in economic growth, fuel prices and other variables made the relatively small potential effect of RGGI on PA emissions and PA to NY imports even more difficult to detect*

Additional Information

- ◆ The study “An Empirical Test for Inter-State Carbon-Dioxide Emissions Leakage Resulting from the Regional Greenhouse Gas Initiative” may be found at: http://www.nyiso.com/public/media_room/publications_presentations/index.jsp
- ◆ For more information on NYISO Transactions: http://www.nyiso.com/public/webdocs/services/market_training/workshops_courses/marketplace_overview/Transactions.pdf

The New York Independent System Operator (NYISO) is a not-for-profit corporation responsible for operating the state's bulk electricity grid, administering New York's competitive wholesale electricity markets, conducting comprehensive long-term planning for the state's electric power system, and advancing the technological infrastructure of the electric system serving the Empire State.



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