New England States Committee on Electricity

NESCOE
Phone: 203-380-1477
E-Mail: AllisonSmith@nescoe.com
Web: www.nescoe.com

2010 RTO Metrics Report: NESCOE Data Summary

Allison Smith

ABSTRACT

Summary of comparative data across RTOS on selected metrics that may be of interest to New England

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Introduction and Approach to Data Review

Background: The RTO Metrics Report originated with a review undertaken by the United States Government Accountability Office in 2008 at the request of the U.S. Senate Committee on Homeland Security and Governmental Affairs. To more effectively analyze ISO/RTO benefits and performance, the Government Accountability Office recommended that the FERC work with ISOs/RTOs, stakeholders and other interested parties to standardize measures that track the performance of ISO/RTO operations and markets, and to report the performance results to Congress and the public.

The RTO Metrics Report provides information on various data points that are common to each of the transmission system operators, and was prepared at FERC's direction.[1] FERC held meetings with industry stakeholders for their input and established an open comment period on the proposed metrics. ISOs and RTOs compiled information and tracked certain data points relevant to performance in the areas of reliability, wholesale electricity market performance and organizational effectiveness.

Data Summary Approach and Context: This data summary endeavors to present some comparative data across RTOS on some of the metrics that may be of interest to New England.[2] However, it is important to be mindful when considering such comparisons that RTO-specific processes and context are central to the data and thus, to any comparisons. Viewing the data outside of the context of each RTO may tell an incomplete story. The RTO to RTO comparisons presented in this memo are not intended to draw conclusions about ISO-NE performance but rather to help identify areas that may be worth exploring with ISO-NE. Over the long term RTO to RTO comparisons may be helpful to help identify best practices.[3] For example, data associated with transmission project cost estimates as compared to their final actual costs across various regions could provide useful information regarding cost estimation practices.

The text passages in this memo are excerpts from the RTO Metrics Report that may be of interest; observations are presented in *italics*.

This memo provides data in the following subject matters: RTO Functions; Wholesale Power Markets; Price Convergence; Fuel Diversity; Wind Forecast Accuracy; Demand Response. The RTO Metrics Report contains data and observations from other market areas not addressed in this memo.

North American Electric Reliability Corporation: RTO Functional Models

The six RTO/ISOs differ in the components of the electricity markets they operate. The chart below describes the aspects each RTO controls. Data and information provided in this memo may vary based on the operations under management of each RTO.

NERC Functional Models						
	Cal-ISO	ISO-NE	Midwest ISO	NYISO	PJM	SPP
Balancing Authority	x	x	x	x	x	
Interchange Authority		x	x	x	x	x
Planning Authority	x	x	x	x	x	x
Reliability Coordinator		x	x	x	x	x
Resource Planner		x		x	x	
Transmission Operator	x	x		x	x	
Transmission Planner		x		x	x	x
Transmission Service	x	x	x	x	x	x

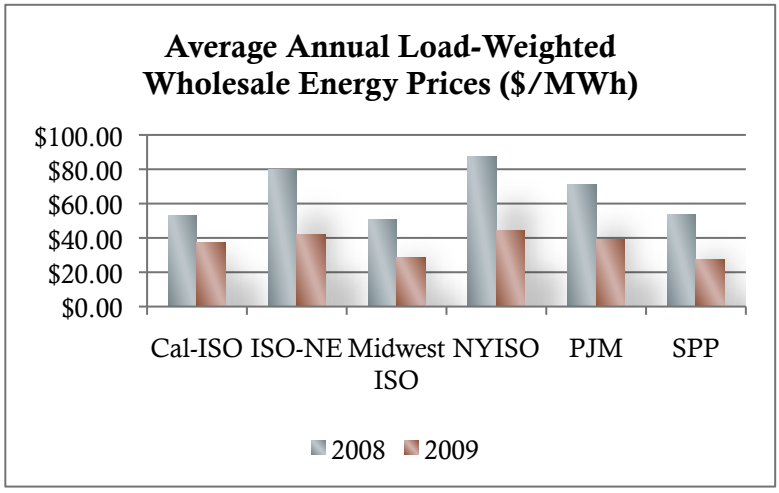
[1] The RTO Report may be accessed at this link: http://www.isorto.org/atf/cf/%7B5B4E85C6-7EAC-40A0-8DC3-003829518EBD%7D/2010%20ISO-RTO%20Metrics%20Report.pdf

[2] The RTO Report does not present RTO to RTO comparisons.

[3] It is understood that the data in the 2011 RTO Report will be consistent with that in the 2010 RTO Report. Changes to RTO metrics may be made in future years. In 2011, the Commission is expected to work on metrics reporting in non-RTO regions.

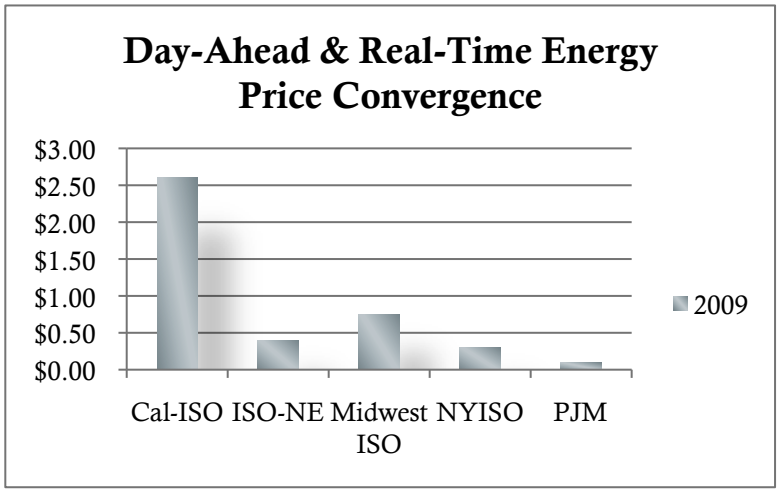
Wholesale Power Markets

The average cost of electricity declined significantly across every RTO in 2009. New England and New York saw the steepest price drops, both nearly 50%. In New England the yearly average real-time LMP has trended downward for the past five years. Historically natural gas prices have influenced the LMP. In 2008 gas prices increased and drove prices up for on-peak hours. As a result the highest on-peak average Hub LMP was $90.35/MWh, nearly twice as high as the 2009 price at $46.57/MWh. The same trend followed in New York where the average cost of electricity was $48.63 per megawatt-hour (MWh) in 2009, down from an average of $95.31 per MWh in 2008. It was the lowest in the NYISO's ten-year history, dropping below the $49.90 per MWh set in 2002.



Price Convergence

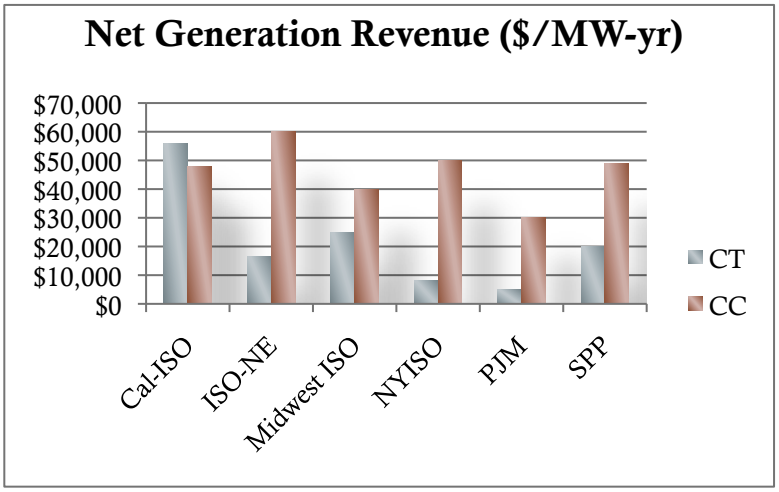
Good price convergence with the real-time market helps ensure efficient day-ahead commitments that reflect real-time operating needs. Better convergence is indicated by a smaller dollar spread. Differences between ISO/RTO regions can be driven by several factors including differences in transmission congestion, market rules, virtual market participation and concentration of intermittent resources.



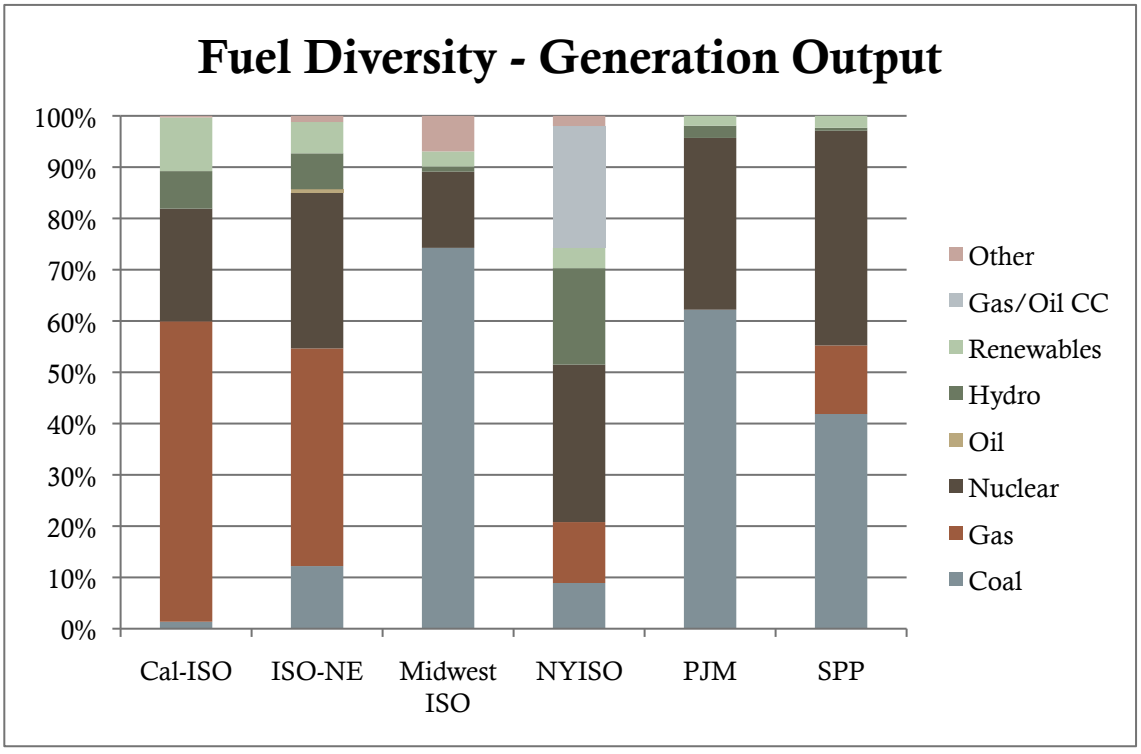
Net Generation Revenue

When compared to total fixed costs, net revenue is an indicator of generation investment profitability and thus is a measure of overall market performance as well as a measure of the incentive to invest in new generation and in existing generation to serve ISO/RTO markets. Net revenue quantifies the contribution to total fixed costs received by generators from all markets in an ISO/RTO.

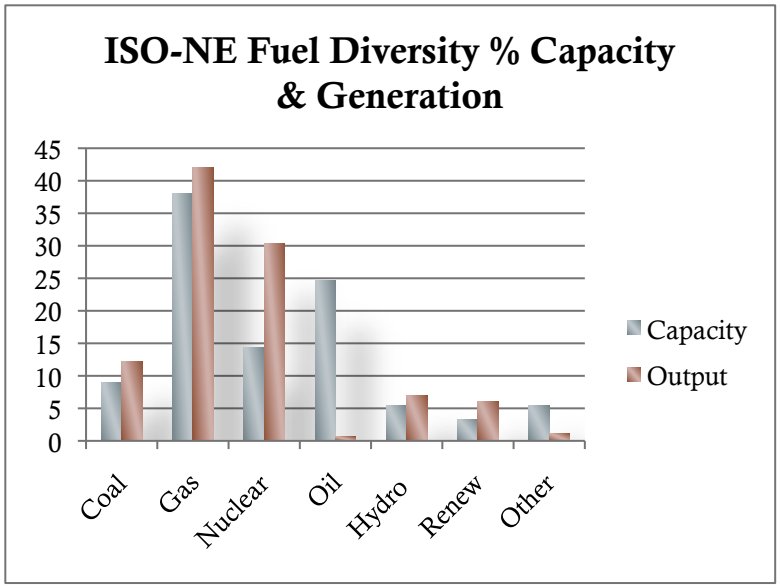
The 2009 results for a typical new combined cycle unit show a substantial decrease in net revenues compared to 2008 net revenues. The 2009 net revenue estimates for a hypothetical combined cycle unit fall substantially below the $191/kW-yr annualized fixed cost estimated provided by the CEC. (p.50)



Fuel Diversity



ISO-NE Generation



Renewable Resources

Midwest ISO

The Midwest ISO's renewable energy produced as a percentage of total energy rose from 0.5% in 2005 to 3.1% in 2009. In 2009, there were 1,141 curtailments of wind that were backed down due to local congestion issues. This included the curtailment of an estimated 291,674 MWh of energy and spanned over 8,005 duration hours.

NYISO

In 2009, the NYISO became the first grid operator to dispatch wind power fully balancing the reliability requirements of the power system with the use of the least costly power available. Including wind power in the economic dispatch allows more efficient management of the resources and minimizes the duration of wind-power curtailments.

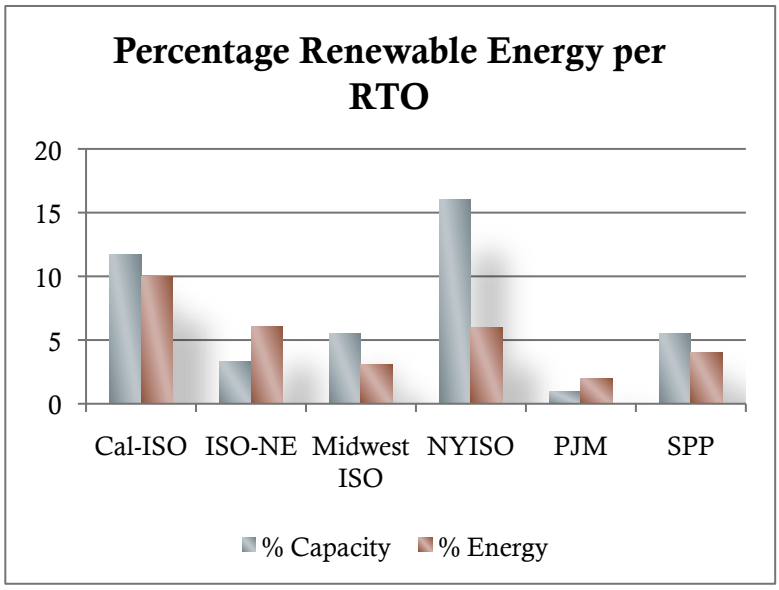
2006. There are now over 1,200 MW of wind generation in operation with an additional 7,000 MW proposed for grid connection. (p.257)

PJM

In terms of megawatts of potential new generating capacity, more than 50% of PJM's year-end 2009 interconnection queues relates to potential wind or solar plants. It is significant to note that the total potential new generating capacity in PJM's year-end 2009 interconnection queues represent 46% of the year-end 2009 generating capacity installed in the PJM region. (p.282)

At the same time, there were 3,648 MWs of nameplate wind generation in operation at 46 facilities, and 2,752 MWs under construction. In addition, there are 5.5 MW of solar on line at two facilities in the PJM region. (p.306)

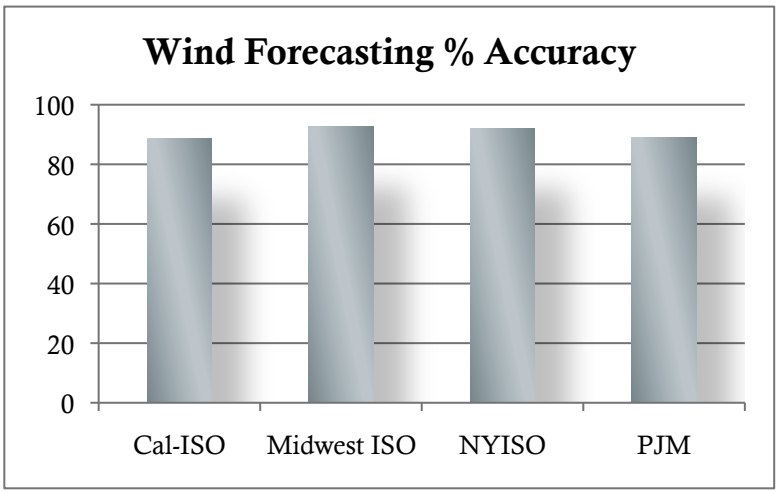
The Renewable Energy Dashboard at www.green.pjm.com illustrates a user-friendly snapshot of the amount and type of generation that currently provides power to the 51 million people in the PJM region.



Wind Forecast Accuracy

In mid-2008, the NYISO instituted one of the first state-of-the-art wind forecasting systems in the United States incorporating wind power forecasts into Day-Ahead and Real-Time Market tools to improve commitment and scheduling of resources. The centralized system enables the NYISO to better utilize and accommodate wind energy by forecasting the availability and timing of wind-powered generation. The real-time forecasts are updated every 15-minutes and integrated into the NYISO's real-time Security Constrained Dispatch. (p.205)

ISO-NE only has 175 MW of wind on the system right now and so does not do special wind forecasting. However, ISO-NE plans to transition to a state-of-the-art forecasting system as VERs reach 500-1,000MW on the system. Such a system works toward these goals by producing a forecast for expected VER generation ideally for a range of timeframes (including next hours, next day, and the following week) to allow for optimizing short-term maintenance scheduling, unit commitment, and real-time unit dispatch. (p.79)



Demand Response

Midwest ISO

The Midwest ISO also allows demand response resources that meet specified requirements to participate in the following markets: energy, regulation, spinning reserves and non-spinning reserves. Demand response resources are actively participating in each of these areas. In addition, Midwest ISO's demand response as a percentage of the synchronized reserve market was 3.9% in 2009. Midwest ISO's demand response as a percentage of the regulation market was 2.7% in 2009. Midwest ISO launched its ancillary services market in January 2009. Therefore, there was no demand response participation in Midwest ISO ancillary services market prior to 2009. Widespread agreement is being reached that the most efficient (and economic) use of demand response resources lies in the provision of reserve services. The Midwest ISO was able to add spinning reserve service to those available to DRR during 2009, albeit with a 10% cap on the total MW allowed. (p.168)

The Midwest ISO is working to include Demand Response and Energy Efficiency in the long-term planning process (MTEP). A major independent study has been conducted to project demand response and energy efficiency savings potential across the Midwest ISO footprint at a detailed and local level. The inclusion of demand response and energy efficiency could have significant effects upon transmission and generation requirements in long-term planning.

NYISO

From 2005 to 2009, NYISO Day Ahead Demand Response program provided energy savings averaging $8.9 million annually, for a total of $44 million, with resources total nearly 2,400 MW in 2009.[4] When New York experienced its record peak load in August 2006, NYISO demand response programs shaved the peak by an average of 865 MW, providing estimated savings of $91 million. These savings are quantified by assessing the cost of providing a similar amount of capacity from peaking units.

The last report found that the overall average hourly wholesale LBMP reduction from scheduled DADRP load reductions was $0.27/MWh, On a monthly basis, the average hourly price reduction was most significant in the months of January 2009 ($0.93/MWh), November 2008 ($0.70/MWh) and September 2008 ($0.64/MWh). There were no price impacts for the summer months of May through August 2009, due to minimal load reduction offers and even fewer scheduled reductions. (p.231)

There were no NYISO deployments of demand response in 2007, 2008, or 2009.

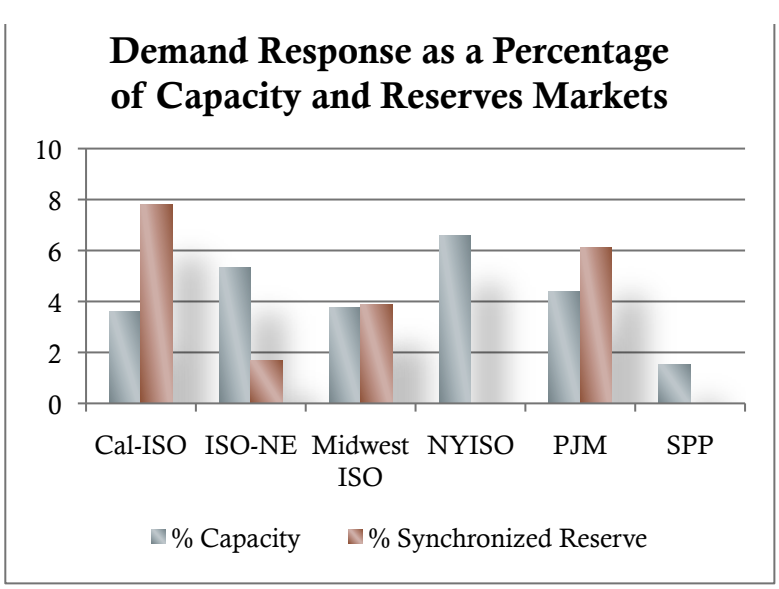
The savings associated with location of generation and demand-response resources are estimated at $500 million annually. This estimate is based on the transmission congestion costs that would have been incurred to transport power from other regions and the costs that would have been incurred to add new transmission capacity. (p.257)

PJM

The PJM RPM provides a mechanism by which generation, demand response and transmission can compete on equal footing, thereby providing a transparent mechanism by which demand response can participate in the capacity market. Through this mechanism, the quantity of demand response that is providing capacity in the PJM footprint has increased by over 1,800 MW. The resulting avoidance of infrastructure development represents savings to the region of approximately $275 million per year.

In addition to the production cost benefit of operating the larger footprint, the transparent price signals produced by the operation of the *LMP energy market enable demand response to actively participate and compete directly with generation*. Because the value of energy is made transparent in real time, demand responders that otherwise would have no incentive to reduce demand can do so in response to real time prices, thereby competing directly with generation resources. This ability, although difficult to quantify as an annual average value, has the effect of reducing the cost to all load by reducing real-time prices, most particularly during times of high system demand. (p.284)

[4] Data on the Location Based Marginal Price impact of demand response resources participating in the NYISO's Day-Ahead Demand Response Program can be found in the NYISO's annual compliance file to the FERC, Docket No. ER01-3001. (p.227)



DR Availability

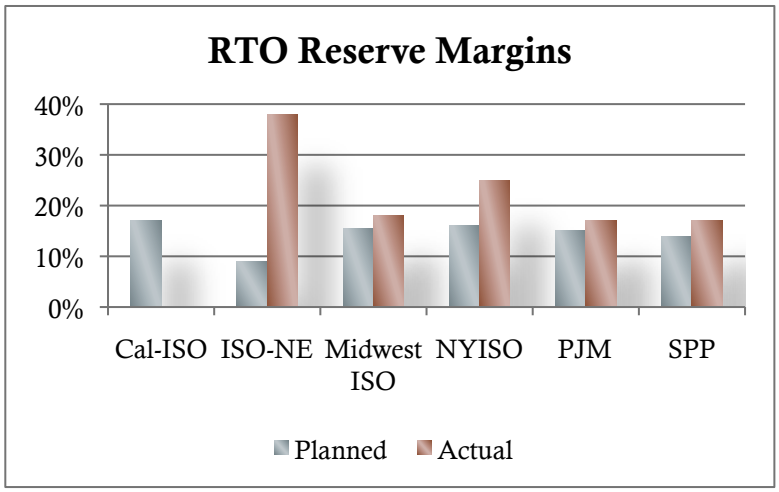
ISO-NE
These data show that real-time demand-response resource availability was assessed at 76%, and real-time emergency-generation resource availability was assessed at 73%. Average active demand-resource availability was 75%. As highlighted in the following table, with passive demand resources assessed at 100% availability, overall demand-resource availability was estimated to be 84%. (p.121, 122)

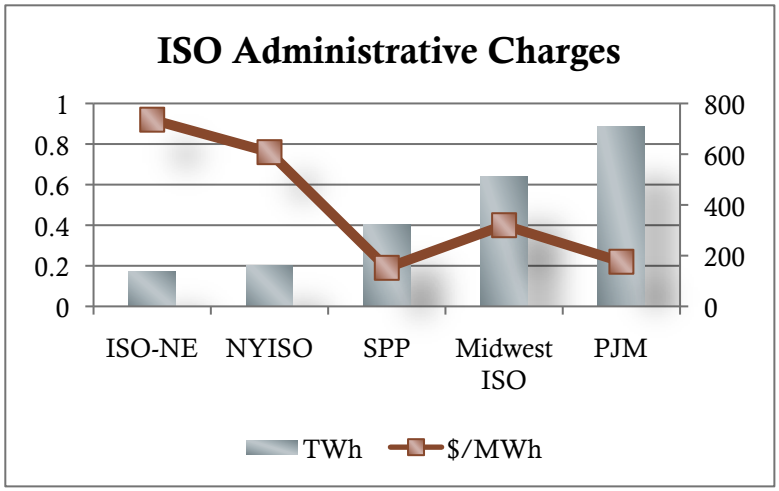
PJM
The 2009/2010 delivery year marks the first time PJM has required demand side resources to test their capability to deliver the reductions committed to meet capacity requirements. The test results for the 2009/2010 deliver year demonstrate that in aggregate, committed demand side resources performed at 118% of their committed capacity values.
Demand resources in 16 of the 17 transmission zones in the PJM region tested at more than 100% of their respective commitment levels. These commitments were made by 80 Curtailment Service Providers (CSPs) in 17 transmission zones with a total of 336 CSP/zone combinations. (p.301)

ISO Operations

From the chart it appears that ISO-NE's reserve margin stands out among its peers. The lowest Actual RM occurred in 2006 at 4,253 MW and 15.1%. The highest was in 2009 at 9,603 MW and 38.3%. The lowest Planned RM occurred in 2005 at 2,472 MW and 9.4%, and the highest was in 2008 at 2,990 MW and 10.7%.[5] ISO-NE believes that New England has one of the lowest installed reserve margins of all balancing authority areas and that it is reliant to a greater degree than other areas on tie-line benefits and emergency actions to meet its installed capacity requirement. The ISO currently is discussing these topics with its stakeholders. If the tie-line benefits and emergency actions are taken into consideration, the resultant PRM will be more comparable to other balancing authority areas.

[5] Planned Reserve Margin MW = (NICR MW) – (Forecast Annual Peak Load MW).
The PRM also can be expressed as a percentage of forecasted annual peak load using the following formula: (PRM MW) / (forecasted annual peak load MW)] x 100. (p.91)



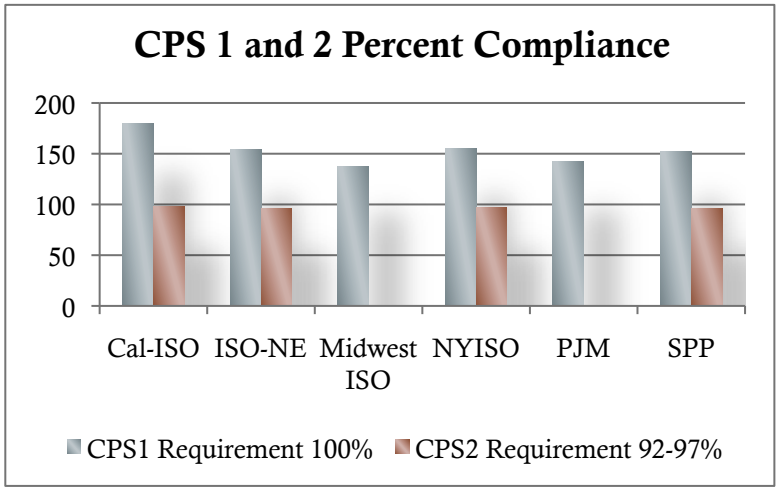


NERC CPS-1 and CPS-2 Compliance

Performance Standard No. 1 (CPS1) and Control Performance Standard No. 2 (CPS2) are designed to maintain interconnection steady-state frequency within defined limits by balancing real power demand and supply in real time. NERC Standard BAL-001-0.1a, *Real Power Balancing Control Performance*, defines CPS1 and CPS2 as follows:

- CPS1 compliance is defined as at least 100% for a rolling annual average. ISO-NE must be 100% compliant with CPS1 throughout a 12-month period.
- CPS2 compliance is defined as greater than 90%. ISO-NE has an internal goal of managing CPS2 within a monthly average of between 92% and 97%.

In addition, ISO-NE reviews CPS compliance annually to determine whether its regulation requirements, specified as a function of month, day type, and hour, need to be adjusted or modified. Since 2005, regulation requirements have decreased as a result of more efficient and effective generation dispatch and new operational tools, such as electronic dispatch and very short-term load forecasting. The system operators have also ensured compliance with CPS2 by carefully monitoring real-time economic dispatch and those generators providing regulation service. Consequently, lower amounts of regulation are needed to provide the required regulation service and subsequently meet the CPS2 target. (p.74)



Generation RMR contract costs

The NYISO did not have any generating units under Reliability Must Run (RMR) contracts from 2005 through 2009. However, out of merit generation was dispatched in order to comply with reliability criteria.

Generator RMR Contracts 2009	# Units	MW	Cost ($millions)	% In/Decrease
Cal-ISO	19	2000	39.1	-41
ISO-NE	8	2,711	84.9	-42%
PJM	1	383		

Transmission Planning

Rather than providing a summary of transmission planning in each region, these excerpts provide a snapshot of transmission planning components in other RTOs that differ from the New England approach.

NYISO does not "approve" or "require" facilities to be constructed for reliability purposes. The NYISO's role is to evaluate and monitor the reliability of the system, assess reliability needs, and solicit market solutions. The second step is the creation of the CRP that consists of proposed solutions to address the needs identified in the RNA, if any. Generation, transmission, and demand side programs are considered on a comparable basis as potential reliability solutions.

SPP's new generation interconnection process was designed to improve processing times and give precedence to more serious projects that are further along in the development process. To attain these goals, SPP now has three interconnection queues rather than just one. That is, interconnection customers now choose to begin in one of three queues:

(a) the Feasibility Study Queue,
(b) the Preliminary Interconnection System Impact Study (PISIS) Queue, and (c) the Definitive Interconnection System Impact Study (DISIS) Queue.

The Feasibility Queue and the PISIS Queue are not required for projects seeking interconnection in SPP. Instead, they provide an avenue for projects to acquire information that will aid them in deciding whether to move forward with their projects. These two queues require lower deposits and less strict milestones.

California ISO Special Initiatives

The following paragraphs describe special initiatives in California that deal with developments New England will also likely face in the near future: connecting renewables and variable energy resources, energy storage devices, and bidding demand response into markets.

In 2006, the ISO proposed, and the FERC accepted in 2007, the Location Constrained Resource Interconnection financing tool, which eases the financial burden of renewable project developers by allocating the costs to multiple generators connecting to the same facilities as they come on line.

In 2008 and 2009, the ISO stepped up its activities by collaborating with vendors, utilities and state agencies to conduct test pilots. The ISO is participating in the Western Electricity's Coordinating Council's Western Interconnection Synchrophasor Program, which leverages a mature technology in new ways critical in managing the renewable resources, including electric vehicles charging (and storage).

The ISO also participated in seven storage pilots in 2008-2009 that investigated several different things including how battery storage can help match renewables generation with available transmission capacity and how to best use storage for regulation, spinning reserves and frequency response.

The Board approved the Proxy Demand Response proposal in late 2009 that set forth the conditions in which aggregators and load-serving entities could bid demand reductions into the ISO markets, and the ISO expects to follow with the reliability demand response product to integrate emergency responsive demand into ISO markets and operations.