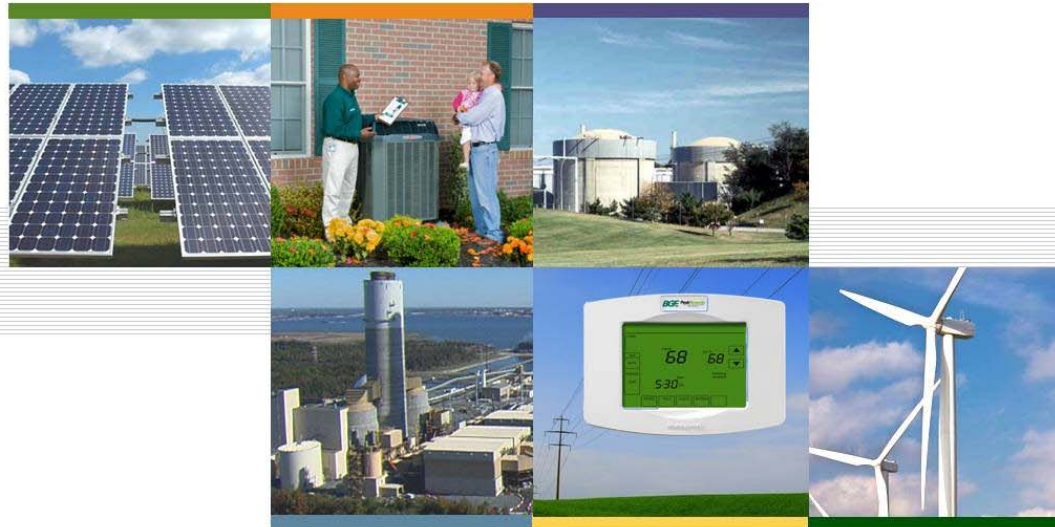




Constellation Energy®



Environmental Regulations – Energy & Capacity Market Mid-Term Considerations

The way energy **works**.™

Chris Wentlent
October 6, 2011

Upcoming State, Regional & Federal Regulations

Air Related

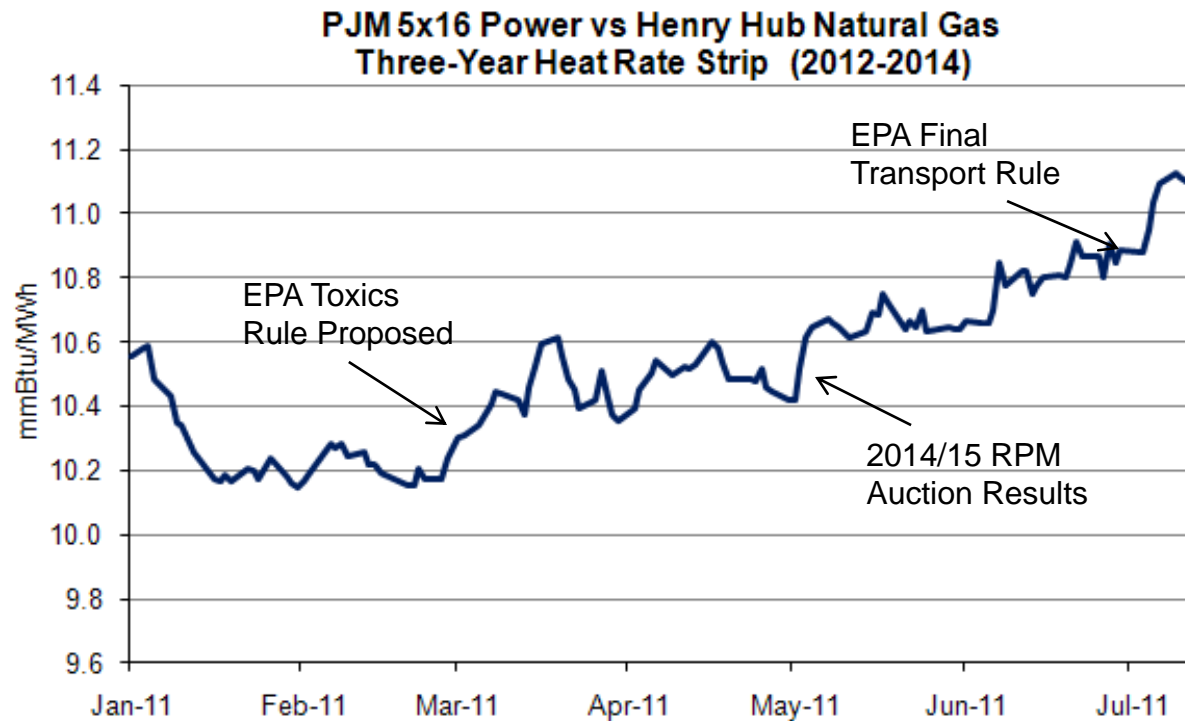
- EPA Cross State Air Pollution Rule (“CSAPR”) – NO_x & SO₂ emissions
 - Phase 1 – January 2012
 - Phase 2 – January 2014
- **NY DEC NO_x RACT – NO_x Emissions**
 - **Site Specific Proposed Compliance Plans due – January 1, 2012**
 - **Facility Compliance Date – July 1, 2014**
- EPA MACT – 187 Hazardous Air Pollutants
 - Final Rule Promulgated November 2011
 - Effective Compliance Date – January 1, 2015
- **Regional Greenhouse Gas Initiative – CO₂ emissions**
 - **Second Compliance – 2012-2014**

Water Related

- **NY BTA Cooling Water Policy – Cooling Water Intake Once Through Cooling**
 - **Site specific driven by SPDES permit renewal**

Forward Energy Prices Boosted By EPA Rules

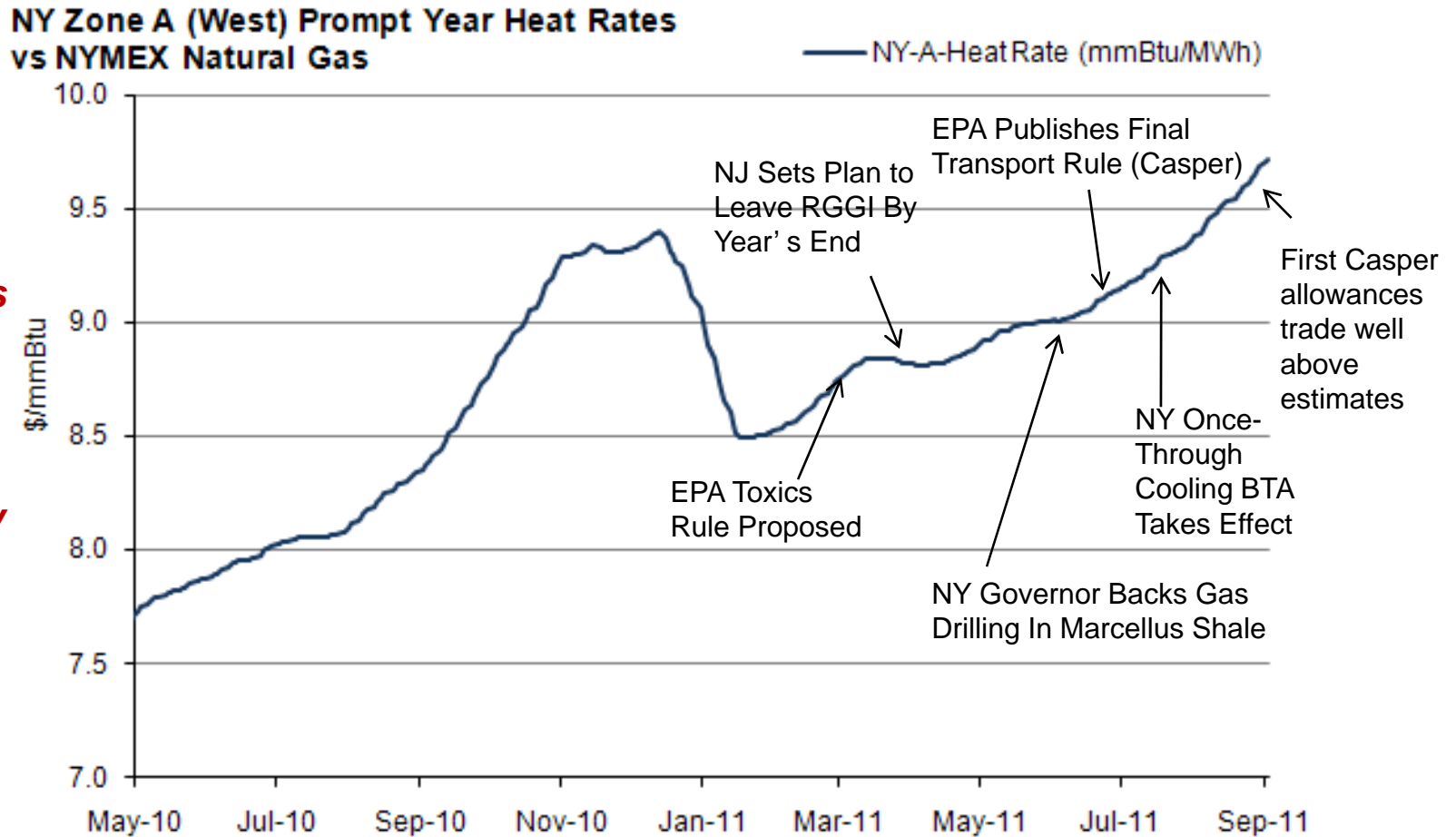
Increasing environmental compliance costs and coal retirement expectations have boosted forward energy and capacity values



- EPA rules, in particular CSAPR (“Transport”) and HAPS MACT (“Toxics”) rules, are increasing generator offers into RPM and coal plant dispatch costs, spurring retirements.
- The final Transport rule is tighter than the 2010 proposal, adding to energy and capacity price uplift beginning in 2012. PJM estimates dispatch costs will rise \$0.60/MWh to \$8/MWh to run new controls
- PJM and MISO have recently released reports regarding forecasted impacts of impending environmental regulations on their respective markets.

Environmental Rules Boost Forward Energy Prices

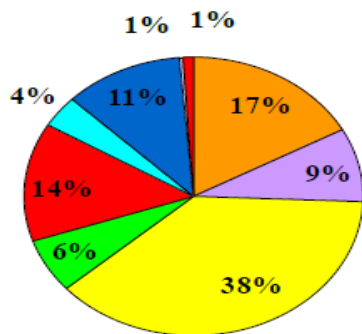
Rising costs, retirement expectations push up forward energy and capacity values



NY-A heat rates for 2012 (prompt-year) have risen since early this year due to an array of new environmental rules moving forward and a declining natural gas view.

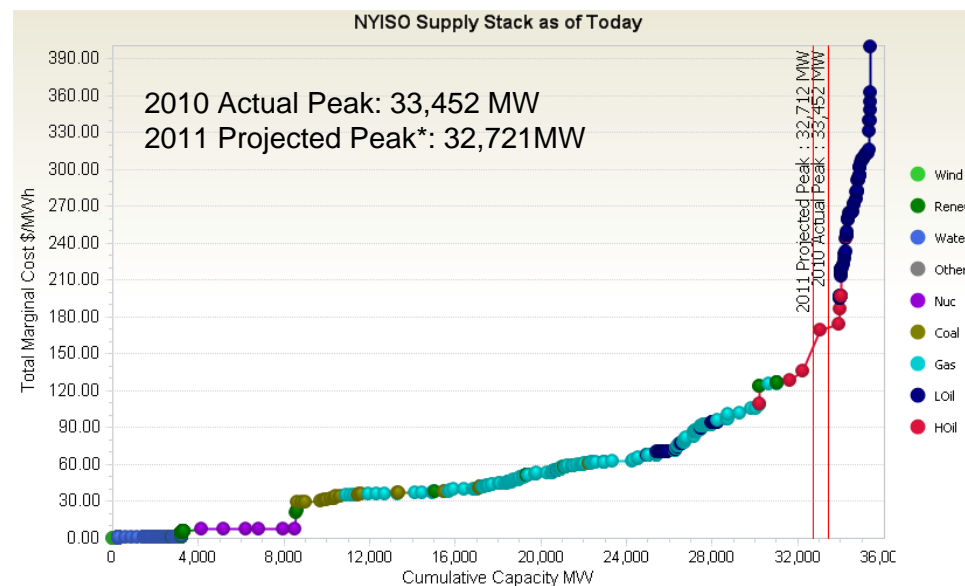
Generation stack and supply curve

Summer 2011 = 37,707 MW



- MW (1)
- GAS - 6,415 (17%)
 - OIL - 3,242 (9%)
 - GAS & OIL - 14,275 (38%)
 - COAL - 2,380 (6%)
 - NUCLEAR - 5,215 (14%)
 - HYDRO (PS) - 1,404 (4%)
 - HYDRO - 4,274 (11%)
 - WIND (2) - 131 (1%)
 - OTHER (3) - 371 (1%)

(1) - All values are from the Summer Capability column in Table III-2 and are rounded to the nearest whole MW.
 (2) - Wind Generators - Summer Rating = 10% of Nameplate
 (3) - Includes Methane, Refuse, Solar & Wood
 (PS) - Pumped Storage



NYISO Summer Capacity and Reserve Margin Projection											
	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021
Existing Gen Capacity	37,707	38,285	39,010	39,010	39,064	39,064	39,064	39,064	39,064	39,064	39,064
Additions	578	726	-	54	-	-	-	-	-	-	-
Retirements	-	-	-	-	-	-	-	-	-	-	-
Special Case Resources	2,053	2,053	2,053	2,053	2,053	2,053	2,053	2,053	2,053	2,053	2,053
Net Purchases and Sales	1,821	1,959	1,959	1,954	1,904	1,904	1,904	1,904	1,904	1,904	1,904
Total Resources Capacity	42,159	43,023	43,023	43,071	43,021	43,021	43,021	43,021	43,021	43,021	43,021
Forecasted Load	32,712	33,182	33,433	33,609	33,678	33,749	33,916	34,190	34,533	34,867	35,192
Reserve Margin	28.9%	29.7%	28.7%	28.2%	27.7%	27.5%	26.8%	25.8%	24.6%	23.4%	22.2%

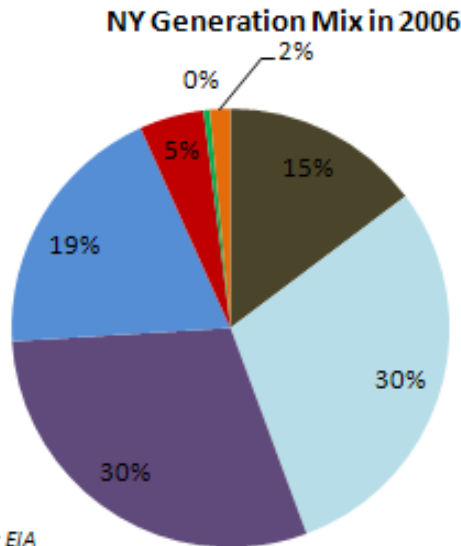
Source: NYISO Gold Book 2011

In NYISO's study, **assuming no future retirements**, 0.73% /yr load growth and no other new builds except under construction units, reserve margin stays above the current requirement of 15.5% for the coming 10 yrs.

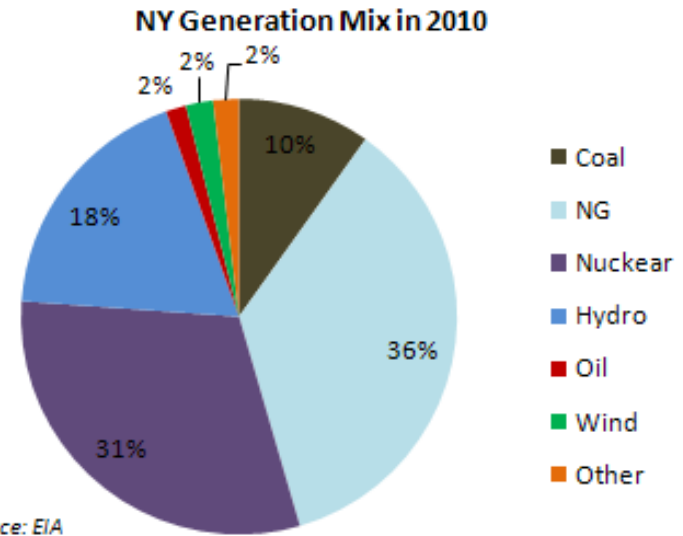
*Peak demand based on NYISO summer 2011

NY generation mix tilts further toward gas

Actual generation by fuel in NY:



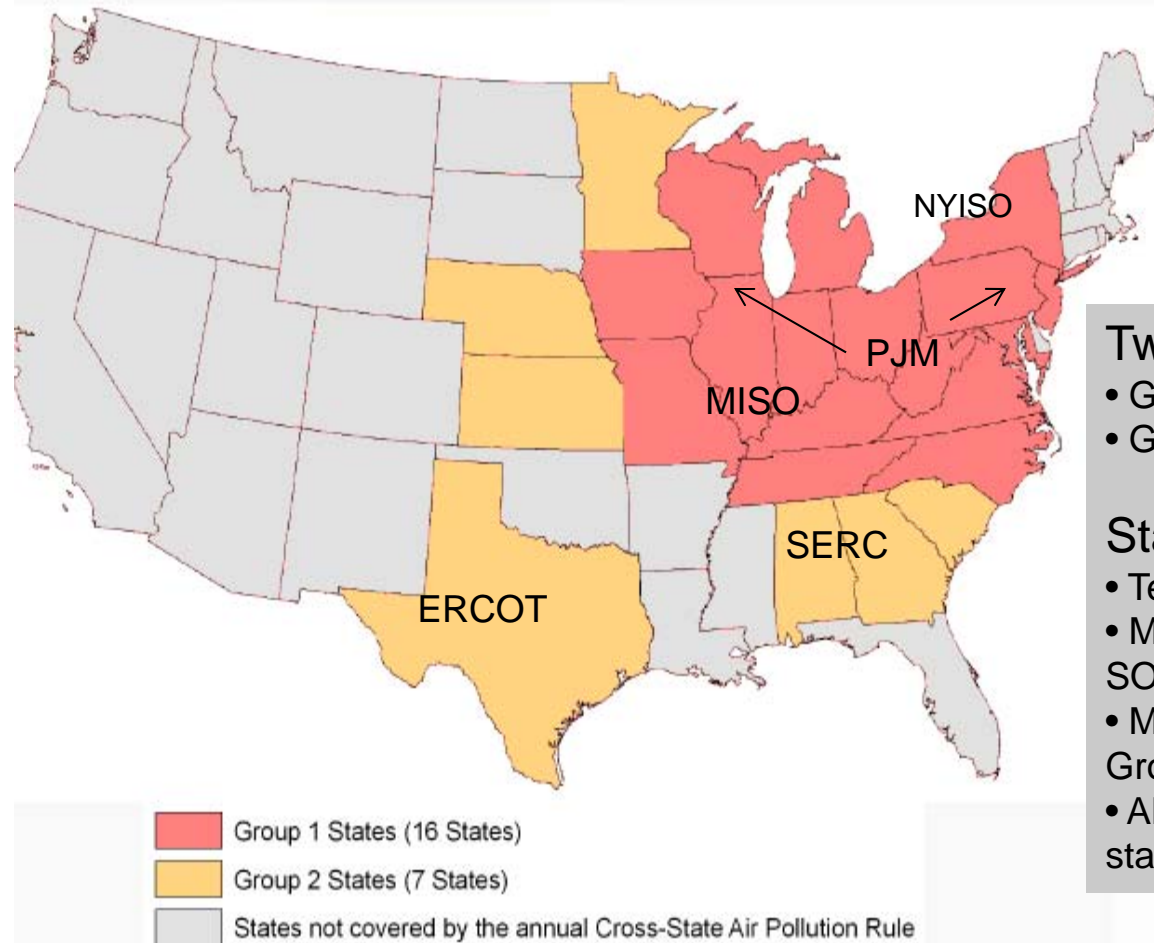
Source: EIA



Source: EIA

- From 2006-2010, share of gas generation increased from 30% to 36%, while oil shrank from 5% to 2% and coal generation from 15% to 10%.
- Nuclear and in-state hydro generation are little changed from 2006.
- Wind gained 2%, or 314MW, due to the 1,300MW wind capacity addition in the state.

EPA Casper SO2 rules will hit most eastern markets



Two Control Groups

- Group 1 - 2012 cap lower in 2014
- Group 2 - 2012 cap only

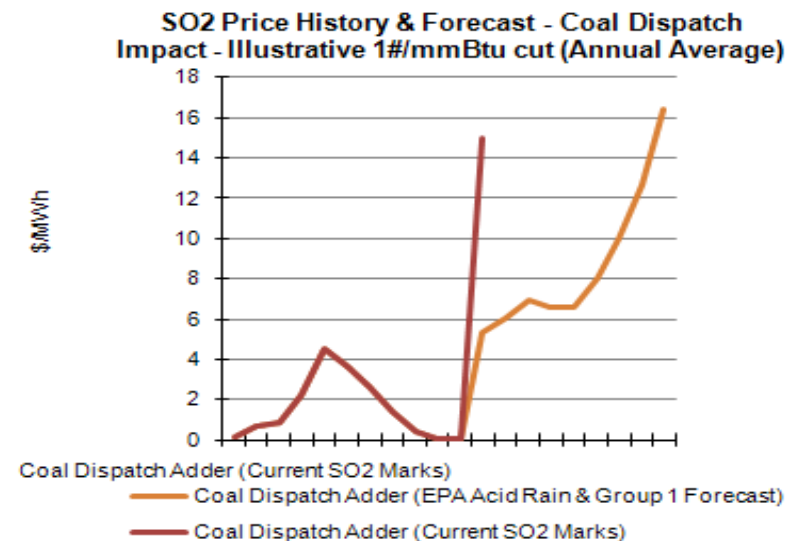
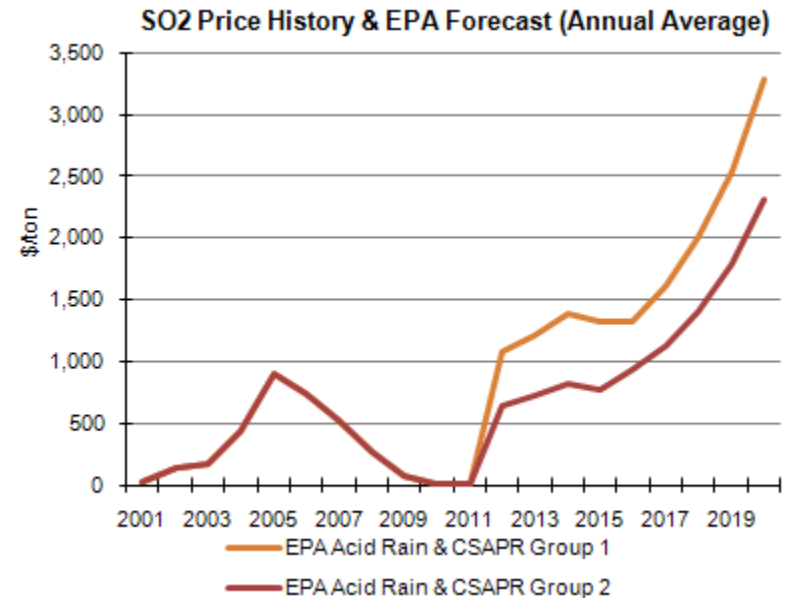
State Status Changes

- Texas added to Group 2 SO2
- Massachusetts, Connecticut removed from SO2 Group 2
- Maryland, NJ, and Tennessee moved from Group 2 to Group 1
- Alabama moved from being the shortest state in Group 2 to the longest.

For the Final Rule, EPA chose to implement their “limited interstate trading” option. In fact, trading within the four allowance markets is unlimited. The “limits” are actually incentives to encourage states to reduce emissions close to EPA’s budgeted levels. If generators in a state emit more than 118% of the state budget, then any generator within the state emitting above 118% of their individual budget will have to retire 2 additional allowances for each ton above the 118%. Thus, tons above 118% actually cost the generator 3 times the allowance price. The extra 2 allowances retired to cover this overage can be allowances from the period when the overage occurred, or from the subsequent year (i.e., you can borrow from one year in the future to cover the penalty tons). Emitting above 118% is NOT a violation of the Clean Air Act.

Casper rule emissions markets indicated above forecasts

- Early indications of markets for emissions allowances under the Cross-State Air Pollution Rule are well above forecasted price levels
- **Forward market heat rates have expanded since the rule was released in July 7, 2011, and since its predecessor the Transport rule came out a year earlier, perhaps reflecting some internalizing of emissions costs.**
- There is some potential Texas could have its implementation delayed or be excluded from the rule, and a lower (though significant) probability the entire program could be impacted by court rulings, possibly delaying the expected Jan. 1, 2012 start date
- **Rising gas supply and increasing gas unit capacity factors are likely to replace any decrease in coal output as a result of the higher emissions penalties when compliance begins**



Sources: EPA modeling under CSAPR, July 2011. CER Fundamentals, Argus Air Daily.

NY CASPR Allocation + 18% Trading Cap vs. 2010 Actual Emissions

CASPR			
	NY 2010 Actual Emissions	CSAPR 2012	CSAPR 2014
SO2 Annual	48,056	32,233	21,920
NOx Annual	24,750	20,689	
NOx Seasonal	12,455	10,077	

NY NOx RACT Regulation – Part 227

- New York State Environmental Board has approved the New York State Department of Environmental Conservation's (DEC) regulation on Reasonably Available Control Technology for the Control of Nitrogen Oxides (NOx RACT).
- **The deadline for submitting applications for a permit modification or a RACT analysis is January 1, 2012.**
- **The deadline for compliance with the RACT control requirements is July 1, 2014**
- An owner or operator of an existing emission source may opt to comply with this Subpart by shutting down the emission source. The intent to shut down must be recorded as part of a federally enforceable permit modification prior to January 1, 2012, **wherein the owner or operator commits to permanently shut down the emission source prior to December 31, 2014**
- Each boiler must meet either a Presumption or Case by Case Analysis
 - Presumptive RACT limits are category-wide requirements
 - Case-by-case RACT determinations consider the technological and economic circumstances of the individual emission source
- Compliance with these emission limits must be determined from:
 - May 1 to September 30, a **24-hour** heat input-weighted average basis in accordance with the provisions of section 227-2.6 (a)(1) of this Subpart.
 - October 1st to April 30th, a **30 day** rolling heat input-weighted average may be used to demonstrate compliance.

NOx Ract – Emissions Requirements

- Emission limits are determined based on a heat input-weighted average basis
- Startup and Shutdowns are included in the weighted average calculation
- Requirements for Large Boiler Type are listed below:

NOx Requirement (lbs/mmbtu) – fuel type	Tangential	Wall Fired	Cyclone	Circulating Fluidized Bed
Gas	.08	.08	N/A	N/A
Gas/Oil	.15	.15	.20	N/A
Coal – Wet Bottom	.12	.12	.20	N/A
Coal – Dry Bottom	.12	.12	N/A	N/A

EPA EGU MACT Proposal or “Toxics Rule”

On March 16, 2011, EPA proposed a Section 112 rule to establish Maximum Achievable Control Technology (MACT) standards for Hazardous Air Pollutants (HAPs), emitted from coal and oil fired electric utilities, also known as the Toxics rule. The final rule is expected to be published Nov. 17, barring any delays, with compliance to begin January 2015.

Rule Details

- First time standards of hazardous air pollutants (HAPs) from coal & oil steam electric generating units (EGUs) affecting ~1,200 existing coal-fired units.
- **Numeric limits for acid gases, mercury and other metals; work practice standards for organics.**
- The proposal would result in significant emission reductions (through additional controls, fuel switching and retirements)
- EPA MACT has a site specific application, that is command & control in nature
- EPA projects the installation of following controls (capital costs)
 - 56 GW of dry sorbent injection (DSI)
 - 25 GW of dry FGD
 - 93 GW of activated carbon injection (ACI); and
 - 166 GW of fabric filters (FF).

* x

Source: x

RGGI – Second Compliance 2012-2014

- Changes to current program currently are being discussed with the participating states
 - New Jersey has opted out of the program for second compliance period
 - New Hampshire Legislature recently approved continuation in the program

RGGI 2012 program review is expected to examine the Regional Greenhouse Gas Initiative's (RGGI) successes and operations including:

- Can additional emission reductions be achieved?
- Has it caused higher emissions outside its member states' borders?
- Can the program's total allocation cap be tightened?
- Should the allowance minimum floor price be increased?

NYSDEC - BTA Once-Through Cooling Water Intake Policy

- **The policy outlines the reductions in impingement mortality and entrainment required to minimize the environmental impact caused by industrial facilities having cooling water intake structures (CWIS) in connection with a point source thermal discharge.**
 - Impingement is the death of life stages of fish entrapped on outer part of a cooling water intake structure
 - Entrainment is incorporation of life stages of fish entering the intake structure and passing through the cooling water intake system
- **Policy applies to all existing and proposed industrial facilities designed to withdraw twenty (20) million gallons per day or more of water from waters of New York State.**
- **Performance Goals of Policy:**
 - **Wet closed cycle cooling or its equivalent for existing industrial facilities**
 - **Equivalent is defined as 90% or greater of that achieved by a wet closed cycle cooling system**
 - Wet closed cycle cooling for all repowered industrial facilities

BTA Policy/cont'd

- Facility owners can employ operational measures which include reduction in cooling water capacity (technology change), and fish protection outages
- **Policy will be implemented when an applicant seeks a new SPDES permit**
- BTA compliance will be on a site specific, case by case basis
- Facilities that fail to meet the entrainment performance goal may initiate a modification to its SPDES permit to require additional mitigation measures.
- **Policy Effective July 10, 2011**

NY Megawatts at Risk – By Program

- The array of proposed regulations is estimated to impact 23,957 megawatts of capacity, more than half the installed generating capacity in New York State

Environmental Regulation (s)	Potential Megawatts @ Risk Within NYISO
NOx RACT – Part 227	~9,500 mws
EPA MACT-Air Toxics Rule	~11,100mws
BTA – Cooling Water Intake	4,410-7,376 mws
RGGI – CO2	All fossil units (oil, gas, coal) > 25 mws

Possible Market Impacts

- Increased Natural Gas Utilization due to coal displacement by natural gas units
- Natural Gas Volatility due to increased demand or pipeline limitations
- Possible capacity supply reduction due to retirements (coal/oil) and associated impact on capacity prices
- Off-peak price impacts due to emissions adders/or coal displacement with natural gas
- Increased renewable expansion
- Transmission & Distribution Impacts??
- Reliability Impacts

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