

Environmental Issues Update

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Objectives

- Provide an update on key environmental issues affecting electric generating plants in the Northeastern U.S. covering
 - High Electric Demand Days (HEDD) strategy
 - Regional Greenhouse Gas Initiative (RGGI)
 - Renewable portfolio standards
- Discuss their potential significance on system planning and system reliability

HEDD Strategy

- HEDD generally correlate with high ozone days
- This affects six northeastern states with severe ozone nonattainment
- States are committed to reduce NOx tons on HEDD

State	NOx tons/day	% reduction from HEDD units
CT	11.7	25
DE	7.3	20
MD	23.5	32
NJ	19.8	28
NY	50.8	27
PA	21.8	32
Total	134.9	

HEDD

- States may allow plants various strategies to achieve reductions besides adding NOx controls. These include
 - Increase energy efficiency
 - Add clean and replacing high emitting distributed generation
 - Reducing generator capacity
- The triggering mechanism is still being discussed with the generators
- NY reduction is for SENY only. Is problematic since some in-city generators must switch from gas to oil on peak days
- Goes into effect the summer of 2009
- Potential regional and local reliability issues

RGGI Update

- RGGI is a regional CO₂ cap and trade program starting in 2009
- Ten Northeastern States will be participating affecting all of ISO NE, NYISO and 3 states in PJM (NJ, DE and MD)
- CO₂ Cap is 188.1 million tons
- First 3 yr compliance period ends 12/31/11
- Compliance means: a generator must hold sufficient allowances plus offsets to cover its CO₂ emissions during the a compliance period, i.e., 2009-2011, 2012-2014, etc.
- One allowance equals one ton of CO₂ emissions

RGGI State Caps (Allowances)

State	CO ₂ Cap Million (Short*) Tons
Connecticut	10.70
Maine	5.95
Massachusetts	26.66
New Hampshire	8.62
Rhode Island	2.66
Vermont	1.23
New York	64.31
New Jersey	22.89
Delaware	7.56
Maryland	37.50
Total (10 States)	188.08

*short ton = 2000 lbs

RGGI Update (cont.)

- States setting up regulations or passing legislation to implement RGGI
- RGGI, Inc established for administration and technical support and has no authority
- Allowances
 - Most states are leaning towards 100% auction
 - RGGI Auction design is underway
 - First auction second quarter of 2008. Not all states may be ready
- Offsets can be used for 3.3 % of compliance needs
- Higher CO₂ allowance price triggers allow use of offsets for 5% (\$7) and 10% (\$10) of compliance needs

RGGI Fossil Generator Emission Cost Adders: SO₂, NO_x and CO₂

For illustrative purposes only

CO₂ allowance cost does not appear to change relative dispatch order of fossil plants at the allowance prices projected by RGGI ICF

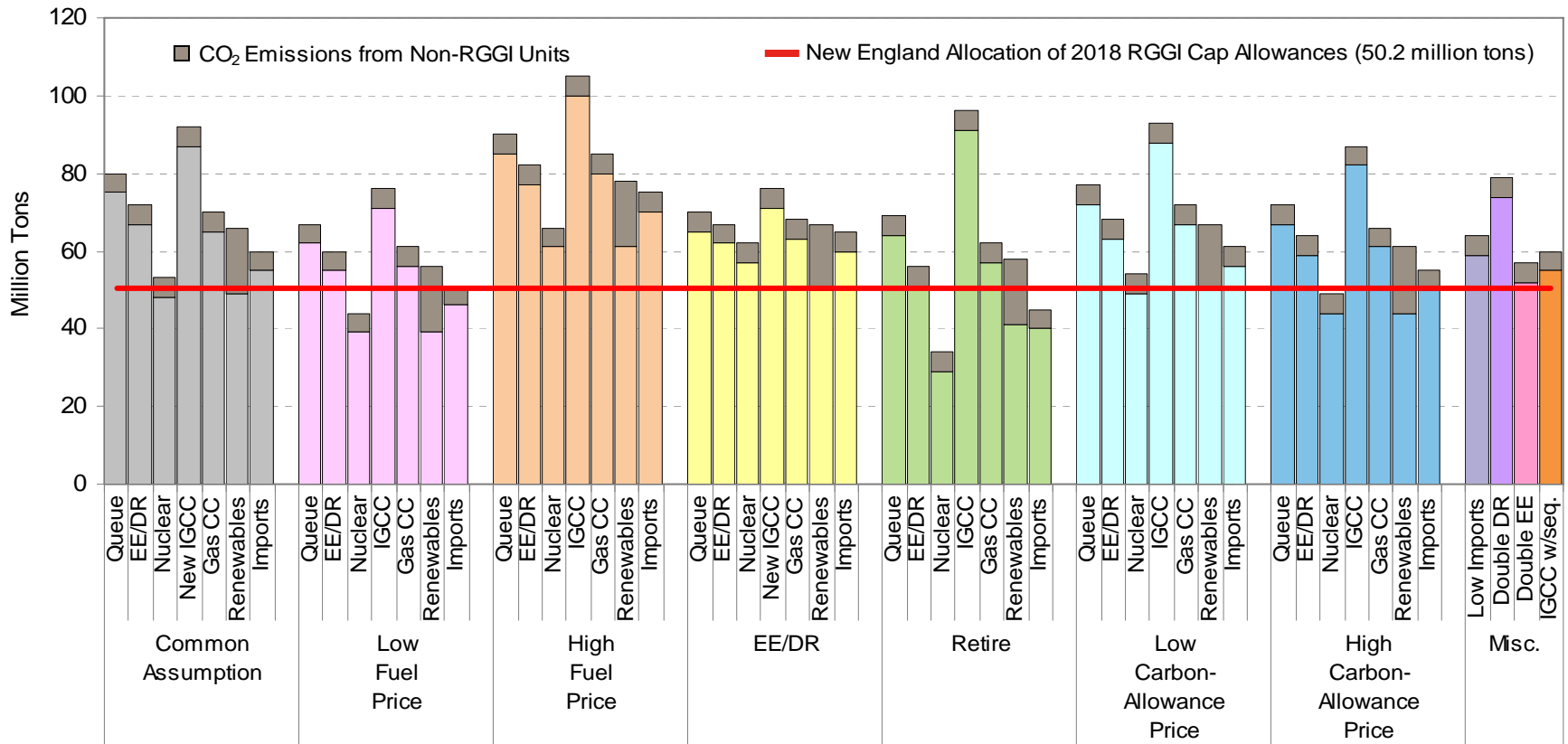
Typical Plant	Fuel \$/MBtu	Fuel \$/MWh	SO ₂ \$/MWh	NO _x \$/MWh	CO ₂ \$/MWh	Total \$/MWh
Gas combined cycle	7	49	0	0.1	2.1	51
Oil peaking steam plant	7	73.5	11.5	4.4	5.4	95
Coal base load steam plant	2.25	20	4.7	4.4	4.4	34

Allowance prices (\$/ton) assumed: SO₂: 1085, NO_x: 2800, CO₂: 5

New England Scenario Analysis CO₂ Emissions

- ISO New England conducted a long term analysis of seven alternative resource scenarios
- Analysis simulated one year (somewhere in the period 2020-2025) of system costs, reliability and environmental impacts
- The CO₂ emissions levels may make meeting the RGGI cap in 2018 and beyond challenging as shown on the next slide

Total annual CO₂ emissions, grouped by sensitivity case and showing the New England allocation of the 2018 RGGI cap allowances*



* Reference: New England Electricity Scenario Analysis Report

http://www.iso-ne.com/committees/comm_wkgrps/otr/sas/mtrls/elec_report/index.html

RGGI Implications for Generators and Market

- RGGI generators will have an additional dispatch cost adder starting in 2009 with coal and oil plants having higher CO₂ adders than gas
- RGGI may increase
 - Operation of non or low CO₂ emitting plants
 - Imports from non-RGGI regions (leakage)
- Costs of CO₂ allowances would have to be recovered in the wholesale power markets similar to SO₂ and NO_x allowances today
- NYISO calculated in 2008 Reliability Needs Assessment (RNA) that it would need a minimum of 52 million allowances

Renewable Resources Update



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Northeastern U.S. Renewable Resources

- New England, New York and many states in PJM have Renewable Portfolio Standards (RPS)
- The intent is to encourage development of new renewable resources for a cleaner and more diversified energy portfolio
- Generally, RPS specify a growth rate for specific types of renewables, but the maximum percent targets and horizon years vary. Currently some are over 20%
- RPS requires load serving entities to meet targets or, alternatively, make payments to a renewable fund
- Wind is the principal new renewable resource being developed in the Northeast

Northeastern U.S. Renewables

- Will the RPS be achieved?
- A look at what's in the ISO/RTOs interconnection queue can give some clue and assuming all projects are built
- New England with queue additions would be somewhat deficient by 2016
- New York's renewable additions could lower the minimum required CO₂ allowances
- If all PJM queue renewables are built they should meet the RPS targets

Environmental Issues: What do they mean for Inter-regional Planning?

What impacts will air regulations have on power plants?

- Will increase the costs of fossil power plants
- Fossil generating plants will have increased emission constraints from new air regulations. This translates to
 - More complex plant operation
 - Economic bidding most likely to recognize costs of new emission allowances
 - Can affect startup/shutdown & flexibility
 - Compliance strategy may limit energy from plants
 - Higher costs for emissions compliance
- Regulations will have little or no impact on costs of non- and low-emitting power plants e.g. nuclear, hydro and fuel cells

What impacts will these regulations have on power plants? (cont.)

- Coal plants are more vulnerable than gas/oil-fired units
 - Higher CO₂ emissions
 - Mercury emissions
 - Gas/oil price differential with coal may still give coal an economic advantage even with added CO₂ costs
 - Potential for added costs for cooling towers
- May cause earlier plant retirements due to changing economics or inability to comply
 - ISOs concern for generating unit attrition when outlook shows need for more capacity with the 5-10 year planning horizon.
- Overlapping maintenance or refurbishing scheduling for compliance

What Impacts on System Reliability?

- Meeting resource adequacy requirements may encourage shift to low or non-CO₂ emitting generating options
 - Ontario's plan for replacement of coal fired units
 - RGGI regional economic expansion modeling yielded
 - Mostly wind and new combined cycle with low natural gas prices
 - Mostly clean coal, more wind and some combined cycle with high gas prices
 - Potentially can change transmission flow patterns and this may require additional system improvements

Summary

- Leading environmental issues are global warming, ozone attainment, mercury reductions and water discharge
- Addressing these issues leads to very complex policy evaluations and decisions, e.g., HEDD
- In response to regulations, costs for generators will likely increase and therefore energy costs will likely increase
- Region's response to these issues needs to be flexible to not impair electric system reliability

Next Steps

- Build on previous reports and presentations to the IPSAC that have discussed environmental planning issues
- Identify issues concerning integration of renewable and demand side resources
- Examine transmission system requirements for importing renewable resources from neighboring regions
 - Today's focus