



IPSAC Meeting  
March 23, 2007  
Agenda Item III

# Northeast Coordinated System Plan 2006 (NCSP06) – Environmental Report for IPSAC Review

Joint ISO/RTO Planning Committee (JIPC)  
March 23, 2007

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# Section 1 Introduction

This report is one of several separate reports being developed to comprise the Northeast Coordinated System Plan for 2006 (NCSP06). This report presents a high level summary of the major environmental regulations that could potentially impact the bulk power system of the Northeastern United States and Eastern Canada. These regulations deal with air emissions and the potential requirement for reduced thermal discharge from power plants. This report also covers renewable portfolio standards in the U.S. and similar developments in Canada. The NCSP06 covers a planning horizon to the year 2011, or later, and comprises four major areas: 1) transmission, 2) resource adequacy, 3) fuel diversity, and 4) environmental issues with each having its own report. This Environmental Report has various time horizons that are generally beyond 2011 related to implementation of environmental regulations and achieving renewable resource targets.

The NCSP06 Report updates the NCSP05 report and reflects the joint planning among the Northeastern U.S and Eastern Canadian electric system control areas: PJM, NYISO, ISO New England, Ontario IESO, Hydro Quebec and the Maritimes

## Section 2 Environmental Issues

This section describes the key environmental issues and their associated regulations affecting the Northeastern U.S and Eastern Canadian control areas. The issues and regulations deal with air emissions and water impacts from generating plants and renewable resource development. These have the potential to affect the future planning of the regional electric grids and their reliability.

### 2.1 Northeastern United States and Canada's Air Regulations

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This section highlights key air regulations that will likely affect many of the fossil generators in the northeastern U.S. and Eastern Canada over the next ten years. The discussion then indicates how these upcoming air regulations could impact the economics and availability of electric generators and thus potentially impact bulk electric system operation and reliability.

#### 2.1.1 Northeastern United States

A number of new federal, regional and state environmental regulations are being implemented over the next ten years that will directly affect fossil-fueled electric generators within the northeastern U.S. These regulations principally affect air emissions and the federal and regional regulations include the Clean Air Interstate Rule (CAIR), CAIR Plus, the Clean Air Mercury Rule (CAMR), NO<sub>x</sub> Reductions on High Electric Demand Days (HEDD), the Clean Air Visibility Rule (CAVR), and the Regional Greenhouse Gas Initiative (RGGI). Significant new state regulations are also identified and summarized under the respective states.

##### 2.1.1.1 Clean Air Interstate Rule (CAIR) - U.S. EPA

The U.S. EPA promulgated the Clean Air Interstate Rule in 2005 as an additional measure needed to achieve ozone attainment in areas in the Eastern U.S still not in attainment. The Rule would require SO<sub>2</sub> and NO<sub>x</sub> reductions across a twenty-eight (28) state region which includes all northeastern states except Maine, Vermont, New Hampshire and Rhode Island. CAIR would require stationary source NO<sub>x</sub> reductions to meet a cap of 3.3 million tons by 2009, and additional reductions to meet a lower cap of 1.3 million tons by 2015. Similarly, total generator SO<sub>2</sub> emissions in these states would have to meet a cap of 3.6 million tons by 2010 and a lower cap of 2.5 million tons by 2015. Allowance trading would be allowed with the states having the option to implement their own trading system. The NO<sub>x</sub> cap would replace the nineteen states NO<sub>x</sub> State Implementation Plan (SIP) Call Budget Program currently in effect. States have the option to set their own budget allocations in this program. States have the option to use the proposed federal program or create their own CAIR rules.

##### 2.1.1.2 CAIR Plus - Ozone Transport Commission (OTC)

Because CAIR does not appear to achieve ozone attainment in the more severe ozone non-attainment states, i.e. the so-called "Inner-Corridor" states of New Jersey, New York, Connecticut and Massachusetts, the Ozone Transport Commission (OTC) is evaluating additional ozone attainment measures called CAIR Plus. Several options for lowering stationary source NO<sub>x</sub> reductions for electric generating units are being considered by an industry regulatory working group under the guidance of the OTC.

### *2.1.1.3 High Electric Demand Days (HEDD) NO<sub>x</sub> Reductions - OTC*

The OTC is also coordinating development of a strategy for ozone attainment for the Inner Corridor states on High Electric Demand Days. A white paper by NESCAUM<sup>1</sup> has shown that a high contribution of NO<sub>x</sub> on peak ozone days comes from peaking turbines without NO<sub>x</sub> controls. High ozone days are typically also high electric demand days. A cooperative effort among the OTC, state regulators, power generators and the ISOs/RTOs is evaluating a number of possible strategies to reduce the NO<sub>x</sub> emissions from these peaking turbines on these critical ozone days. The strategies being considered include energy efficiency and clean energy options, controlling units on the peak ozone days, allowance trading schemes, and incentives for installing cleaner generation.

### *2.1.1.4 Clean Air Mercury Rule (CAMR) - U.S. EPA*

The U.S. EPA has promulgated a Clean Air Mercury Rule in 2005 for a portion of the U.S. that requires reductions in mercury (HG) emissions from coal-fired power plants. This rule will be implemented in two phases: a 10 ton reduction to meet a cap of 38 tons by 2010 and another 23-ton reduction to reach a lower cap of 15 tons by 2018. The first phase of CAIR will also help achieve the first CAMR reduction of mercury needed by the year 2010 with the installation of SO<sub>2</sub> scrubbers; however, the second phase of CAMR will most likely require additional mercury emissions controls on coal-fired power plants. Many states are also implementing mercury rules that are more aggressive.

### *2.1.1.5 Clean Air Visibility Rule (CAVR) - U.S. EPA*

The Clean Air Visibility Rule has been promulgated to reduce regional haze from power plants where they affect wilderness areas and scenic views within national parks. This EPA rule requires Best Available Retrofit Technology (BART) and could affect 13 New York generating plants as well as some in Maine, New Hampshire and Vermont. The BART air emission controls are required by 2013. However, if states opt for implementation of CAIR, they will get a waiver from having to mandate BART implementation, since CAIR should achieve better results.

### *2.1.1.6 Regional Greenhouse Gas Initiative (RGGI) – Ten Northeastern States*

The Regional Greenhouse Gas Initiative is an agreement voluntarily entered by currently ten northeastern states to cap CO<sub>2</sub> emissions from electric generators<sup>2</sup> in those states starting January 1, 2009. The RGGI CO<sub>2</sub> cap for these states is 181 million tons starting in 2009 and was based on historical power plant CO<sub>2</sub> emissions for generators in those states. This cap would stay at this level through 2014 and then gradually decrease by 10% to 2018.

Each participating state has a specific allocation of the RGGI CO<sub>2</sub> cap in the form of allowances, and in turn will allocate or auction a portion of its share of CO<sub>2</sub> allowances to fossil-fueled electric generators. The states will set aside a minimum of 25% of their state cap to use (i.e. auction for raising funds) for developing conservation, renewable resources or consumer refunds. RGGI explicitly allows for trading of allowances which should stabilize the cost of compliance. The use of offsets<sup>3</sup> is also allowed for meeting up to 3.3% of a generator's compliance obligation. This can

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<sup>1</sup> The Northeast States for Coordinated Air Use Management (NESCAUM) includes the six New England states plus New York and New Jersey. The NESCAUM White Paper is located at: <http://www.nescaum.org/documents/high-electric-demand-day-and-air-quality-in-the-northeast>.

<sup>2</sup> Electric generators that are equal to or greater than 25 MW in size (capacity).

<sup>3</sup> Offsets are emission reductions achieved in specific energy sectors outside of electric generation

increase to 5% and 10% if the cost of allowances increases to certain trigger levels. The compliance periods are three years, the first being 2009 to 2011.

The economic impact of RGGI for affected fossil generators will be to add the cost of CO<sub>2</sub> allowances to the energy production (bid) cost of these generators. This will penalize coal-fired power plants the most given that they have higher CO<sub>2</sub> emission rates when compared to comparable-sized oil and natural gas-fired power plants.

A RGGI stakeholder process developed a Model Rule to help guide states in developing their new legislation to promulgate regulations such that RGGI would be implemented regionally in a uniform manner. This rule became final in August of 2006. The states now are undertaking the task of deciding on their method for allocating their state cap to generators, set-aside for conservation etc. and their allowance trading programs. Several states have already proposed auctioning 100% of their state cap allowances.

RGGI potentially could result in system reliability impacts by adding a new air emission constraint on the operation of fossil power plants. Such impacts could result from a shortage of allowances and/or offsets in the market due to lack of market liquidity, higher energy demand or poor operation of carbon free resources. Unlike the SO<sub>2</sub> and NO<sub>x</sub> caps, CO<sub>2</sub> does not have any control options that would, like scrubbers for SO<sub>2</sub>, cap the price of CO<sub>2</sub> allowances. This lack of control options makes the CO<sub>2</sub> cap more of a potential reliability issue for the bulk electric system.

#### *2.1.1.7 Major State Regulations*

##### Connecticut:

Connecticut is revising its existing NO<sub>x</sub> Reasonably Achievable Control Technology (RACT) regulations to lower the NO<sub>x</sub> emissions rates of certain generating units in accordance with the OTC 2001 Model Rule and to implement CAIR NO<sub>x</sub> trading. For implementation of CAMR, CT has proposed a Clean Air Mercury Rule to assure compliance of the two coal generators affected by the rule. The rule would require an emission rate of 0.6 lbs/Tutu for these generators by 2013(?) and allow no emission trading.

##### Massachusetts:

Massachusetts has recently implemented the last of its 310 CMR 7.29 multi-pollutant regulations that cover SO<sub>2</sub>, NO<sub>x</sub>, HG and CO<sub>2</sub>. Regulations were already implemented to achieve reductions in SO<sub>2</sub> and NO<sub>x</sub>. They also require compliance by making an 85% reduction in Hg by January 1, 2008 for solid fuel plants, or meeting an emission limit of 0.0075lb/MWh. Similarly, a 95% reduction is required by 2012 or meeting an average emission rate of 0.0025lb/MWh.

These 7.29 regulations set two CO<sub>2</sub> limits for six (6) existing fossil plants in Massachusetts. The first is a CO<sub>2</sub> (mass) cap on each of these plants, which totals 27.8 million tons for the six plants. These CO<sub>2</sub> caps went into effect on January 1, 2006. The second CO<sub>2</sub> limit is an emission rate cap of 1,800 lbs/MHz on all six plants, which takes effect January 1, 2008. No allowance trading is permitted to meet these two caps, but the use of offsets for compliance is allowed. When a regional market ceiling price of \$10/ton for CO<sub>2</sub> offsets is reached, this price caps the amount plants will have to pay for such offsets, and alternatively, the plants can opt to pay into a state fund that supports renewable resource development which could create the offsets.

##### New Hampshire

In 2005 New Hampshire reached an agreement among multiple parties to reduce SO<sub>2</sub> emissions by 90% with installation of scrubbers and reductions in mercury emissions by 80% by 2013 from the state's coal plants. The mercury reductions will exceed the EPA's CAMR requirements and no allowance trading would be permitted.

### New York

New York State has pending environmental regulations that will each have an impact on the New York State generating fleet. The majority of these proposed or recently promulgated regulations will impact the air emissions of existing fossil units, although, some water quality regulations will have increasing compliance costs and additional operational restrictions for the hydro and nuclear plants as well. These new environmental regulations and their potential impact on the generating units follow below.

**State Implementation Plan (SIP) Call:** Continuing exceedances of the ozone standards have resulted in a USEPA review of the New York program to control emissions of ozone precursors. While the NY Department of Environmental Conservation (DEC) is currently working on this program with other States in the Ozone Transport Region, none of the coordinated solutions predict compliance. Options under study include mandatory retirement of older units, additional pollution control technology, and environmental dispatch. The current deadline under the Clean Air Act is 2010. If compliance is not achieved by then, the law calls for USEPA to impose draconian limits on emitters of ozone precursors. Should this possibility happen, it would be reasonable to expect significant generator retirements.

**NY-Clean Air Interstate Rule (CAIR):** New York will follow the Federal CAIR which will require additional reductions in the emissions of sulfur, nitrogen, and particulates from all fossil units in the state. These reductions will be accomplished through the addition of pollution control devices, fuel switching, and reducing a generator's output. The program provides for emissions trading. The cost of this program will be significantly greater than the NY mercury control program and will apply to most fossil units.

**NY Clean Air Mercury Rule:** The NY Mercury Rule will require a major reduction in mercury emissions from coal-fired power plants. This can be achieved through the addition of pollution control devices, fuel switching, and reducing a generator's output. Pollution control technologies include wet and dry flue gas scrubbers, activated carbon injection, and baghouse filters. The NY mercury program is more aggressive than the Federal CAMR with respect to timing, reductions, and restrictions on trading. It requires a 50% reduction by 2010 and 90% by 2015 achieving an emissions rate of 0.6 lb/TBtu on individual units. Mercury control costs will not be the single determinant for the viability of continued operation of the generating units in the coal fleet.

**DEC Consent Orders<sup>4</sup>:** There are a number of DEC consent orders in place that require fossil units to either install pollution control technology or to retire. The affected plants include Dunkirk, Huntley, Russell, Greenridge, Westover, Cayuga, and Lovett. Danskammer is currently under negotiations for a consent order.

**RGGI:** New York State has proposed modifications to the RGGI Model Rule specific for New York. Important ones include the auctioning of 100% of New York's allocation of the RGGI cap allowances

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<sup>4</sup> (Insert definition of consent order for non environmental readers)

and no “free” allocation to generators. The proceeds of auctioning will be used to fund energy efficiency, clean energy technology initiatives. The intended effect of these initiatives will be to dampen the increase in both peak demand and overall energy use while providing incentives for additional investment in clean power resources. A potential problem is in the case that the DEC fails to conduct the allowance auction; the proposed New York RGGI regulations would then give 100% of the allowances to energy efficiency contractors, clean energy project developers. The proposed rule further restricts the generators from using any out of state allowances. These New York specific provisions create considerable uncertainty and therefore a perceived increased risk for investments in fossil units.

**DG Rule:** The DEC is drafting regulations that will limit the amount and duration of use of distributed generation in the Special Case Resources (SCR) and the Energy Demand Response Program (EDRP). DEC analysis shows that these generators contributed significant ozone precursor emissions on days when ozone exceedances occur. These limits are proposed to start this year; although, the required durations of the rule making process suggest that next year is more likely.

**Non Utility Generator (NUG) Contract Expiration:** A number of NUG generators in the New York fleet operate under long-term contracts with utilities. Some of these contracts were originally scheduled to expire over the next several years. These contracts are usually supported by favorable gas supply and transportation contracts as well as Payment in Lieu of Taxes (PILOT) agreements. When these agreements expire, a number of these plants may no longer be economic to operate. Most planning studies done by the NYISO and NYSERDA assume the continued operation of all of these plants which total about 1600 MW. While retirement of these units will be driven by economics, the implications will have notable environmental implications as these units tend to be relatively clean. Should some of these plants cease to operate, the challenge of meeting the emission caps under the RGGI, CAIR, and the NY-SIP will be significantly greater.

#### New Jersey

New Jersey is a participant in both the OTC and RGGI and anticipates the adoption of the rules developed by the OTC. However, it will likely seek reductions in SO<sub>2</sub> and NO<sub>x</sub> beyond those required by CAIR.

New Jersey adopted rules establishing new mercury emissions requirements for coal-fired boilers in the state with two alternative standards for compliance. A boiler would be in compliance if its mercury emissions did not exceed 3 mg/MWh, or if the boiler achieved 90 percent reduction in mercury emissions as measured between the entrance and at the exit of the air pollution control apparatus. The rules establish a compliance deadline of December 15, 2007. However, that deadline could be extended to December 15, 2012 for up to half of a company's New Jersey coal-fired capacity. No trading would be allowed.

#### Pennsylvania

Pennsylvania is also a participant in the OTC and subject to CAIR. Pennsylvania is proposing a plan to cut mercury emissions from coal-fired power plants in the state by 90 percent by 2015. A two-step state-specific plan requires an 80 percent reduction in mercury emissions by 2010, and a 90 percent reduction by 2015. Trading of mercury allowances is prohibited under Pennsylvania's proposal.

#### Maryland

Maryland has passed a Healthy Air Act, which addresses emissions from specific coal fired plants in the state. The Act sets phased reduction targets for the affected plants for NO<sub>x</sub>: 70% reduction by

1/1/2009 and 75% reduction by 1/1/2012. Similarly it sets phased targets for SO<sub>2</sub>: 80% reduction by 1/1/2010 and 85% reduction by 1/1/2012. Similarly, it requires an 80% reduction for mercury by 2010 and increasing to a 90% reduction by 2013. All the above reductions are based on 2002 total emissions. The Act also requires the Governor to include Maryland in RGGI.

### Delaware

Delaware has proposed an Electric Generating Unit Multi-Pollutant Regulation which establishes NO<sub>x</sub>, SO<sub>2</sub>, and mercury emissions limits for Delaware's large electric generation units. This regulation is currently being appealed.

The regulation establishes a NO<sub>x</sub> rate for affected facilities of 0.15 lb/MBtu to be implemented by May 1, 2009. It also establishes mass (tons) emission limits for each affected facility by 2009. After January 1, 2012, units subject to this regulation will be limited to a NO<sub>x</sub> rate of 0.125 lb/MBtu, on a rolling 24-hour average basis.

From May 1, 2009, coal-fired units are limited to a SO<sub>2</sub> rate not to exceed 0.37 lb/MBtu of heat input. After January 1, 2012, coal-fired units are limited to a SO<sub>2</sub> rate not to exceed 0.26 lb/MBtu of heat input, on a rolling 24-hour average basis. After January 1, 2009, there are also annual SO<sub>2</sub> mass emissions limits for the affected units.

For mercury, beginning 1/1/2009, the regulation requires either a mercury rate limit of 1.0 lb/TBtu of heat input, or a minimum reduction of 80% from baseline inlet mercury emissions. By 1/1/2013 the mercury rate must drop to 0.6 lb/TBtu of heat input, or a minimum 90% reduction from the baseline inlet mercury emissions must be attained. The regulations also set mass emissions limits for the affected units.

The regulation also establishes sulfur content limits for units firing on residual oil.

Although Delaware is a participant in RGGI, it intends to propose regulations to address CO<sub>2</sub> emissions from the state's generating units, and regulations to satisfy fine particulate matter (RACT) and (BART) requirements.

### Other PJM States

Other PJM states are subject to CAIR and CAMR standards. Only Illinois has proposed state standards for reductions of mercury emissions from coal-fired power plants by 90 percent by mid-year 2009.

### **2.1.2 Canada**

Canada has both national and provincial SO<sub>2</sub> and NO<sub>x</sub> environmental regulations that restrict air emissions from stationary source, fossil-fueled electric generators.

#### *2.1.2.1 National Regulations*

##### SO<sub>2</sub>:

An SO<sub>2</sub> cap of 2.3 million tonnes<sup>5</sup> was implemented for the seven eastern provinces from 1994 to 1999. A permanent national SO<sub>2</sub> cap of 3.2 million tonnes was implemented in 2000. In that year, the total amount of power plant SO<sub>2</sub> emissions was already 20% below this cap.

#### NO<sub>x</sub>:

For 2005, stationary sources had a NO<sub>x</sub> emissions reduction target of 100,000 tonnes from the forecast aggregate emissions of 970,000 tonnes of NO<sub>x</sub> for that same year.

#### Greenhouse Gases:

In December 2002, Canada ratified the Kyoto Protocol which committed it to reducing greenhouse gas emissions to 6% below 1990 levels through the years 2008 – 2012. However, legislation was never implemented to achieve the reduction. The current Conservative government is changing course to a general “Made-In-Canada” environmental policy affecting greenhouse gases and air and water regulations. The current government says it will not adhere to the original Kyoto commitment of a 6% reduction of GHG emissions but instead favors intensity based targets, i.e. reduction in emissions per production units vs. mass reduction targets. Recently a Clean Air Act was introduced into The Canadian Parliament which focuses on ozone attainment without addressing greenhouse gases. The Canadian Environment Minister said that Canada is 35% above its Kyoto target and can not meet it. Instead the country will focus on achieving absolute reductions of 45 to 65% by 2050 but allow industrial emissions to grow in the short term<sup>6</sup>.

#### *2.1.2.2 Provincial Regulations*

##### Ontario:

Ontario’s Environmental Protection Act regulates the quantity of NO<sub>x</sub>, SO<sub>2</sub> and mercury emissions that are permissible from fossil-fuel electric generation plants. Both NO<sub>x</sub> and SO<sub>2</sub> emissions have been capped: NO<sub>x</sub> at 21,100 tonnes for 2006 and, similarly, SO<sub>2</sub> at 153,500 tonnes. Ontario also has emission performance standards for its coal and oil-fired plants. They are 1.3 kg/MWh (2.86 lbs/MWh) for NO<sub>x</sub> emissions and 4.6 kg/MWh (10.12 lbs/MWh) for SO<sub>2</sub> emissions. Ontario has an emissions trading program in place for both NO<sub>x</sub> and SO<sub>2</sub>.

While Ontario has no provincial climate change plan, its plan to retire existing coal-fired capacity and refurbish existing and/or build new nuclear plants as subsequent replacement capacity, along with developing new renewable resources, will be a major step to reducing CO<sub>2</sub> emissions from Ontario’s electric generation fleet.

##### Quebec:

Since Quebec’s generation capacity is over 90% hydro-electric, there is little need for reductions in SO<sub>2</sub> and NO<sub>x</sub> from the existing fossil generation within the province. Quebec has the lowest GHG emissions per GDP and in lbs/MWh of any Province.

In June of 2006, Quebec announced a Climate Change Plan with a GHG emissions reduction target of 1.5% below 1990 levels by the year 2012. In the electric sector, besides improved efficiency within buildings, the province has large hydro and wind development plans to help achieve these targeted reductions.

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<sup>5</sup> One tonne is equal to 1.1 short tons which is equal to 2,200 lbs.

<sup>6</sup> <http://www.ens-newswire.com/ens/nov2006/2006-11-22-03.asp>

### Maritimes:

None of the Maritime Provinces has a climate change plan. New Brunswick had the second highest growth in GHG emissions for the period 1990 to 2004, just after Saskatchewan. It has set a target that 10% of its electricity be produced from renewable resources by the year 2016.

Nova Scotia has a Green Energy Framework that focuses on the electricity sector and seeks to replace coal-fired generation with wind, biomass and natural gas cogeneration. A climate change plan is scheduled to be released around 2008 as part of an updated energy strategy.

Prince Edward Island (PEI) expects to have an updated climate change plan by the end of 2006. The province has a target of 15% of its electricity being produced by renewable resources by the year 2010, which it expects to meet as early as 2007.

### **2.1.3 Potential Impacts of Environmental Regulations on System Operation and Reliability**

As environmental regulations increase and tighten the air emissions allowed from fossil-fueled power plants, the compliance strategies of individual generators can vary, but can result in the installation of new emissions control equipment, which increases capital investment and operating costs.

As these air regulations affect power plants across the region, central power stations may require long term outages to upgrade environmental air emission controls. These long term outages could present difficulties in maintenance coordination at the ISO level which could affect system reliability.

Older power plants, especially coal fired plants, could have an accumulated impact of environmental controls that could push them toward becoming unprofitable to run, potentially resulting in their retirement. This could have a significant reliability impact as control areas need to add additional capacity just to serve energy growth, so any “unplanned” retirements would directly create an additional new capacity investment. Ontario is an example of a Provincial air policy that is considering the deliberate retirement of coal plants as a strategy to reduce overall air emissions especially to meet the Kyoto target. Expiration of NUG contracts with utilities in New York and other states that could result in retirements are a potential reliability risk as replacement capacity would be needed.

An environmental compliance strategy for power plants could be to switch to cleaner fuels, i.e. from coal to natural gas. However, this move to clean up air emissions may not provide any incremental gains on overall plant efficiency (heat rate), and may be deemed uneconomic in the long-run. It also would increase the dependence on natural gas, which for at least New England is already high from an energy contribution viewpoint, i.e. around 40%.

Recently Canadian cities have petitioned the U.S. EPA to require additional air emissions reductions from 150 U.S.-based coal plants within seven states, claiming their “*Cross-Border*” emissions contributes to Canadian health problems and overall climate warming<sup>7</sup>. This action is a potential environmental “Seams Issue” that could impact inter-area reliability.

In summary, upcoming environmental air regulations will affect power plant economics, which in turn will change the order in which plants are dispatched. This could change traditional transmission

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<sup>7</sup> <http://www.ens-newswire.com/ens/nov2006/2006-11-01-03.asp>

flows and could constrain the existing transmission systems. Study of the accumulated physical and economic impacts on fossil-fueled generators necessary from complying with these new environmental regulations can reveal any potential for future operating and reliability problems.

## **2.2 Water Issues**

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### **2.2.1 United States**

The principal water issue at power plants in the U.S. relates to reducing the impact of their thermal discharge as required by the Clean Water Act Section 316b. That section requires the EPA to insure that the location, design, construction and capacity of cooling water intake structures reflect the best technology available to minimize adverse environmental impact.<sup>8</sup>

The EPA has implemented the rule in three phases. Phase I applies to new facilities, i.e. power plants and manufacturers that withdraw more than two million gallons per day (MGD) of from U.S. waters and use more than 25% of the water for cooling. New facilities with smaller intake amounts will still be regulated on an individual site basis. In December 2001 the EPA established standards for cooling water intake structures at new plants.

Phase II affects large existing facilities designed to withdraw at least 50 MGD and use more than 25% of that water for cooling purposes. The final rule was established in February 2004 and requires that organisms impinged on the intake screens be reduced by 80 to 95% from uncontrolled levels. It also requires that the number of organisms entrained (drawn into) in the cooling system be reduced by 60 to 90% from uncontrolled levels. The rule allows a number of compliance alternatives using fish protection technologies and restorative measures. The rule affects about 550 plants.

Phase III affects other existing facilities such as manufacturers and new offshore and coastal oil and gas extraction facilities, but does not affect power plants.

A recent federal court ruling determined that the affect of Phases I and II on new and existing plants are determined on a technology basis at the national level. The need to add cooling towers may be the required method for compliance which could significantly impact maintenance outages and costs for the affected plants. Once a final decision is made on the technology compliance path, the aggregate impact of the 316b rules on the three Northeast U.S. ISOs would need to be assessed to see if there would be operating and reliability impacts on the electric systems from compliance with these water regulations.

### **2.2.2 Canada**

Canada does not have any proposed cooling water regulations similar to the U.S. Clean Water Act Section 316b.

## **2.3 Renewable Resource Development**

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Significant development of renewable resources is occurring in both the northeastern U.S. and Canada. This is driven mainly by Renewable Portfolio Standards (RPS) established and mandated by most northeastern states as well as renewable energy policy in the Canadian provinces.

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<sup>8</sup> <http://www.epa.gov/waterscience/316b/phase1/316bph1fs.html>

The general RPS structure in the states is to require that a percentage of electric energy produced or purchased by utilities be from designated types of renewable resources. This percentage typically increases annually up to a maximum amount. There are common types among the states of renewable resources that qualify for the RPS such as small hydro, solar, wind, biomass, landfill gas, etc., plus specific types unique for each state's RPS. RPS is intended as an economic stimulus for the commercialization of new "renewable" capacity to achieve a more diverse and cleaner generation portfolio. The widespread introduction of these new technologies, such as wind power, may present technical challenges on their integration in the systems of the ISOs/RTOs, especially as their level of penetration grows to a significant percentage.

### 2.3.1 Northeastern United States

Eleven states served by the three ISOs/RTOs have or are implementing RPS<sup>9</sup>.

Table 2-1 shows the renewable capacity in the interconnection queues of these three ISOs/RTOs. Three PJM states have RPS. An "effective\*" capacity of wind is shown based on an assumed contribution of 20% of its nameplate capacity during a typical summer peak load period.

**Table 2-1: Approximate Renewable Capacity in the three ISO/RTO Inter-Connection Queues (MW)**

ISO/RTO	Hydro	Biomass	Landfill Gas	Wind Nameplate	Wind Effective*	Total
ISO-NE <sup>a</sup>	8	141	7	924	231	387
NYISO <sup>b</sup>	160			5,776	1,155	1,315
PJM <sup>c</sup>	5/250	166/242	37/140	1,505/14,109	3,123	3,963
<b>Total</b>	<b>423</b>	<b>549</b>	<b>184</b>	<b>22,314</b>	<b>4,509</b>	<b>5,665</b>

<sup>a</sup>As of June 4, 2006

<sup>b</sup>As of January 7, 2007

<sup>c</sup>As of December 31, 2006 Queue Active / Queue Under Construction

When considering the effective capacity these new renewable resources would have, the total 3,550 MW represents less than 2% of the peak load for ISO-NE, NYISO and the five RPS states of PJM.

#### New England

Five New England states have RPS and New Hampshire is considering implementing a program. . Maine has met its 30% RPS goal but recent legislation has created an additional renewable capacity requirement by 2017. The other New England states have an increasing requirement of an annual percentage of energy requirements that must be supplied by renewable resources.

ISO-NE has assessed the growth of renewable resources in its Regional System Plan 2006 (RSP06) report based on renewable projects within its interconnection queue. Collectively, by 2015, New England's RPSs would require almost 8,300 GWh of energy production from renewable resources by 2015. However the renewable resources in the ISO interconnection queue in 2006 were estimated to

<sup>9</sup> Maine, Vermont, Connecticut, Rhode Island, Massachusetts, New York, New Jersey, Pennsylvania Delaware, Maryland, and Illinois

provide only about 42% of this new energy growth leaving a considerable shortfall in meeting these current RPS requirements from resources within New England<sup>10</sup>.

#### New York

New York has an RPS requirement that 25% of its energy come from renewable resources by the year 2013. New York is already meeting about 19% of its RPS requirement with renewable resources (mostly hydro), and thus needs an additional 6% to satisfy the goal, or about 10 million MWh. The NYISO Interconnection Queue Report shows 53 wind projects in the interconnection process with a total capacity of 5,776 MW<sup>11</sup>. The report also shows two hydro projects with a combined capacity of 160 MW. Biomass and landfill gas projects in New York currently tend to be of a size or at an interconnection voltage that are not under the jurisdiction of the NYISO.

NY's RPS program is funded through the collection of a surcharge on the customer bills from Investor Owned Utilities. NYSERDA will conduct annual auctions for the purchase of Renewable Energy Credits which are proposed to be produced from new qualified renewable generation facilities.

#### PJM

In PJM, Pennsylvania, New Jersey, Delaware, Maryland and the District of Columbia have RPS requirements. New Jersey has an aggressive RPS requirement of 22.5% by the year 2021. Pennsylvania requires 18% by the same period Delaware requires 10% by 2019, Maryland requires 7.5% by the year 2019 and DC requires 11% by 2022. The capacity of renewable projects in the PJM queue is shown in Table 2-1. The PJM Interconnection Queue Report shows that there are 129 projects with a total nameplate capacity of 15,614 MW. The report also shows a meaningful quantity of Biomass, Methane projects.

### **2.3.2 Canada**

#### Ontario

Ontario is encouraging the development of renewable resources with a Standard Offer of a higher energy payment for renewable projects of less than 10 MW in size. In planning for the transition to new renewable resources as replacement capacity for the retiring coal-fired plants, about 1,800 MW of new renewable projects have been solicited through several RFPs. The projects currently are mostly wind-energy projects.

#### Quebec

Quebec has 1,054 MW of hydro capacity under construction, a portfolio of 4500 MW of planned new hydro-electric capacity beyond 2010, and 4,000 MW of new wind capacity by 2015.

#### Maritimes

In the Maritime Provinces, New Brunswick plans to add low-impact renewable capacity to satisfy 10% of its total energy demand by 2016. Wind projects are expected to provide 400 MW toward this goal.

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<sup>10</sup> Tables 7-2 and 7-4 from the RSP06 Report

<sup>11</sup> As of January 2, 2007

Nova Scotia expects to have 5% of its overall electricity demand satisfied by renewables by the year 2010. The province issued a Green Energy Framework last year that proposed adding 280 MW of new wind capacity to the existing 32 MW of installed wind capacity.

Prince Edward Island (PEI) has mandated meeting a 15% RPS by the year 2010, which it expects to meet by the year 2007.

### **2.3.3 Impact of Renewables**

A major impact of renewable projects is typically their interconnection to the bulk power grid, especially for a project of significant size and remoteness from the existing grid (i.e. a large wind farm project). The intermittency of energy output from wind capacity may become an operating issue when significant amounts of wind become installed on several power grids. A study done for the NYISO found that up to 10% of the ISO's capacity could be wind capacity (or other types of intermittent resources) before operating problems would become significant.

If large amounts of renewably generated energy are to be imported from Canada, this may require significant "loss-of-source" studies. The RPS rules of most northeastern states will need revising if imported energy from large Canadian hydro-electric projects is to qualify for RPS within these states.

# Section 3 Conclusions and Recommendations

## 3.1 Conclusions

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Planned and proposed air regulations have the potential to impact the broader region's wholesale energy prices and reliability. The combined impacts from these regulations need to be monitored and, if necessary, potential reliability impacts studied. Similarly the potential impacts on power plants from Section 316b of the Clean Water Act need to be monitored and evaluated as to potential system reliability impacts.

Renewable Portfolio Standards are a driver in eleven states of the three ISO/RTOs for increasing the development and energy contribution from renewable resources in the region. Canada has similar energy policy goals for the development of renewable resources. Interconnection and integration are potential issues, especially as larger and larger amounts of intermittent energy are provided to the grid. This may need to be studied across the Inter-ISO region.

## 3.2 Recommendations

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The following recommendations pertain to environmental issues.

1. Monitor the implementation of air and water regulations that affect the Inter ISO region and assess if any potential operation and reliability issues arise.
2. Monitor the growth of renewable resources and the potential for integration issues especially if large amounts of wind develop in the region.

*{End of Report}*