Northeast States for Coordinated Air Use Management
EMISSION PERFORMANCE STANDARDS*
MODEL RULE
BACKGROUND INFORMATION DOCUMENT

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* **IMPORTANT NOTE:** Previous versions of this Model Rule referred to Generation Performance Standards (GPS). The name was changed to Emission Performance Standards (EPS) in the final iteration of the Model Rule and Background Information Document to better reflect the intent and applicability of the Model Rule.

Dedication

The NESCAUM EPS Model Rule is dedicated to the memory of George Dunn of the Connecticut Department of Public Utility Control. George's knowledge, experience, warmth, insight, and tireless commitment in serving the public and protecting the environment are greatly missed.

NESCAUM Emission Performance Standards (EPS) Model Rule
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EXECUTIVE SUMMARY

The NESCAUM Model Rule for Emission Performance Standards (EPS)* provides a model for state regulations implementing minimum standards of environmental performance for retail suppliers of electricity. It was developed by a Workgroup of staff from northeastern state air agencies, public utility commissions, and energy offices. The aim of the Workgroup was to develop a regulatory template that can be used by any state wishing to adopt EPS, while also promoting regional consistency in the design of EPS regulations and responding to the objectives of restructuring legislation recently adopted in Connecticut and Massachusetts.

In consideration of state legislative requirements, the evolving structure of competitive electricity markets in the Northeast, and longstanding air quality concerns, the Workgroup defined two objectives for the EPS program described in the Model Rule:

1. to prevent electric utility restructuring from resulting in a degradation of air quality in the Northeast by providing a mechanism to ensure that disparities in environmental regulation do not create a competitive advantage for more polluting resources (i.e., "leveling the environmental playing field"), and

2. to improve air quality in the Northeast and to reduce the adverse impacts of electricity generation on public health and the region's environment.

Consistent with the first of these objectives, the Model Rule proposes output-based emission performance standards for nitrogen oxides (NO_x) and sulfur dioxide (SO_2) based on pollution control levels that will otherwise be required of generators serving the Northeast market. In addition, the Model Rule proposes a standard for carbon dioxide (CO_2) that implies maintenance at overall emission levels recently achieved in the region. Consistent with the second of these objectives, the Model Rule also provides for year-round — rather than just seasonal — NO_x emissions limits and provides a mechanism for collecting data and eventually imposing a standard for mercury emissions.

The EPS program described in the NESCAUM Model Rule represents a new approach to regulating the environmental impacts of electricity production. First, the proposed standards are performance-based, i.e. they express emissions limits in relation to electricity *output,* rather than heat input. Second, the standards apply to retail suppliers rather than to individual generating facilities. Output-based standards provide a mechanism for promoting greater efficiency in electric generation, as well as lower emissions, regardless of plant age or historic fuel use. Their

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application to retail suppliers provides a mechanism for limiting the overall environmental impacts of serving retail electricity demand in a particular state, regardless of the variety and geographic location of generation resources used to serve that demand.

In the Northeast, interest in EPS is motivated by a desire to ensure that competitiveness is introduced to electricity markets in a manner that preserves environmental quality. Currently, emissions control requirements for power generating facilities across the eastern U.S. vary widely, as do electricity costs. These disparities give rise to a concern that electric utility restructuring could lead to a greater reliance on lower cost but more polluting resources *absent comparable environmental performance requirements for all suppliers.* This concern is particularly acute in the Northeast where air pollution problems are already serious and are compounded by the airborne transport of pollutants from upwind regions.

Summary of Provisions

The NESCAUM Model Rule proposes EPS levels of 4 pounds per megawatt-hour (lb/MWh) for SO_2, 1 lb/MWh for NO_x, and 1100 lb/MWh for CO_2. Until more data can be collected, the effective standard for mercury is defined as the actual emissions rate. A standard for carbon monoxide (CO) is reserved for further evaluation. In addition, the Model Rule provides for quarterly information reporting by retail suppliers, penalties for non-compliance, and a regular cycle of standards review, revision, and overall program evaluation.

Under the Model Rule these standards apply annually to the portfolio of generation resources associated with each retail electricity product[1] offered by a retail electricity supplier in the EPS implementing state. Compliance determinations would take into account the amount of electricity supplied by each generation resource and the emissions characteristics of that resource with respect to each of the regulated pollutants. Ideally, these determinations will be made using regional information systems capable of assigning resources and their environmental attributes to retail electricity products. It was the Workgroup's assumption, and strong recommendation, that the same information systems would be used in a consistent way to support EPS and related policies, including renewable portfolio standards (RPS) and information disclosure to consumers. Because the design of such information systems in the NESCAUM states is not yet complete, the Model Rule was designed to be compatible with a variety of underlying methods for linking generation resources to retail sales.

Major Issues Considered in Model Rule Development

Applicability to Retail Suppliers: Recent state legislation concerning EPS is explicitly aimed at limiting the environmental harm caused by electricity generation *to serve retail or end-use customers* in the implementing state. Legislators recognized that the generators serving in-state retail customers might increasingly be located outside the state or even outside the Northeast. If

[1]The Workgroup defines "retail electricity product" to represent a product offered to retail customers that is distinct from other products on the basis of its price, fuel, or environmental characteristics. This definition will be refined as necessary to be consistent with underlying information systems and related policies.

EPS were targeted to in-state electricity generators, it would only apply to a portion of the generation used to serve the implementing state's customers. Instead, EPS is tied to states' authority to license providers of retail electric services and takes into account all generation resources associated with these services.

Applicability to Retail Electricity Products: The Workgroup considered applying EPS to retail suppliers' overall portfolios of generation resources. However, this approach raised important concerns related to consumer protection and support for renewable and clean technologies. Under an overall portfolio approach, a supplier could separately package, and sell at a premium, those relatively low-emitting resources that the supplier must obtain for purposes of EPS compliance. This strategy could result in environmentally conscious customers subsidizing other customers under the mistaken assumption that their purchasing decisions are achieving additional environmental benefit. In addition, it could competitively disadvantage marketers whose entire portfolio is comprised of clean resources. Moreover, as a mechanism intended to facilitate environmental comparability in the competitive electricity market, the Workgroup felt it was appropriate that all products offered to retail customers should meet the same minimum standard of environmental performance.

Inclusion of All Generation Resources in the Compliance Determination: The Workgroup chose to include all resources in compliance determinations, without regard to fuel type. The most important basis for this decision was the Workgroup's judgement that an all-resource approach would provide greater environmental protection over the long run by preventing overall emissions from increasing as a result of shifts in the generation mix. In addition this approach ensures consistency with disclosure requirements, allows greater flexibility for retail suppliers, and provides incentives for renewable and other clean, non-fossil resources. On the whole, the Workgroup felt that these benefits outweighed the concern that EPS would provide an indirect incentive to increase or prolong the region's reliance on nuclear power.

Averaging and Trading Mechanisms, and Interface with Allowance Trading Programs: The Workgroup considered the inclusion of averaging, banking, and trading provisions in the EPS program, as well as the interface of EPS with separate allowance trading programs for generators. The Workgroup ultimately chose not include banking or trading provisions, primarily to avoid added complexity and administrative burdens. Also, most of these mechanisms would undermine the policy rationale for a product-specific approach. Proposed mechanisms for including allowance exchanges under other regulatory programs in the EPS compliance determination raised similar concerns about complexity and interference in other market programs. The Workgroup did develop, and is taking comment on, an option for retail suppliers to buy and retire allowances as an additional means of reducing emissions and ensuring compliance. Beyond this, the Workgroup felt that it would be premature to devise additional averaging or trading mechanisms for EPS, especially given present uncertainty about the future design of underlying information systems in much of the NESCAUM region.

"Gaming" and the Treatment of Imported Power: A recurrent concern in Workgroup discussions was the problem of "gaming"; that is, the possibility that retail suppliers could demonstrate compliance with EPS on paper, but in ways that do not advance its underlying policy objectives. Given the physical impossibility of tracking an electron from generation source to end-use, the gaming problem is inherent to EPS and any related policies. However, opportunities for gaming can be substantially diminished by enlarging the size of the market affected by EPS requirements and by designing comprehensive underlying information systems to support the consistent application of EPS and related policies. Hence, the treatment of imported power in the Model Rule depends on the existence of comparable information systems in exporting regions. If comparable information systems do not exist, imported power is assigned default emissions characteristics, as determined by the state.

Environmental and Economic Impacts

The pollutants included in the Model Rule are responsible for some of the most important environmental impacts associated with electricity production. Importantly, these impacts transcend state and even national boundaries. Broad-based adoption of the Model Rule could achieve significant reductions in these pollutants since the proposed standards reflect the relatively lower emitting characteristics of the region's existing generation mix and the region's commitment to aggressive new emissions limits (in the case of NO_x) with respect to future generation. The magnitude of these benefits depends critically on how many states adopt EPS and on how competitive forces affect future electricity markets. Economic costs and benefits are similarly difficult to quantify. On the one hand, retailers may incur higher costs to obtain the desirable emissions characteristics associated with cleaner resources; in addition, implementation of EPS will incur administrative costs. These costs will depend in part on the design of information systems used to support EPS. On the other hand, failure to equalize environmental performance requirements among competitive suppliers will likely also incur costs, in the form of increased pollution, environmental degradation, and public health risks.

Because of these uncertainties, the EPS values proposed in the Model Rule are not based on a conventional cost-benefit analysis. Rather, their justification rests on the primary rationale behind EPS: to maintain, in the deregulated market, an equal or improved level of environmental performance relative to what would otherwise be required for electricity generation serving the Northeast market. As such, the Workgroup does not anticipate that implementation of the Model Rule would impose an undue economic burden. Electricity cost differentials in different parts of the eastern U.S. far exceed the estimated costs of achieving emissions controls for SO_2 and NO_x at the levels contemplated in the Model Rule. Compliance with the proposed CO_2 EPS could eventually pose more of a challenge, particularly if nuclear units retire while older fossil generation remains on line. However, renewable and other advanced technologies, together with combined cycle gas turbine technology should increasingly provide economic alternatives for reducing CO_2 emissions from the overall generation mix, especially over the timeframe of likely nuclear retirements. The Model Rule provides for periodic revision and re-evaluation so that these and other factors can be considered and adjustments made to the EPS program over time.

Next Steps

The NESCAUM Model Rule is intended to serve as a template or model and does not itself impose any requirements or regulations. To adopt EPS, states will need to conduct formal administrative processes and can choose to use or modify the Model Rule as they deem appropriate. Presently, three NESCAUM states have adopted EPS provisions. Massachusetts must implement EPS for at least one pollutant by 2003 (it can implement EPS for more pollutants; it can also act before 2003 under certain conditions). Connecticut must develop EPS regulations, but these regulations do not go into effect until other states in the Ozone Transport Region with a minimum combined population of 27 million adopt similar regulations. Finally, New Jersey's legislation provides for the adoption of EPS if other states in its power pool adopt EPS, or if EPS is necessary to achieve air quality objectives. Meanwhile, an important next step for Northeast states will be to assist in the design and implementation of information systems throughout the region that can effectively support EPS and other restructuring-related policies.

NESCAUM Emission Performance Standards (EPS) Model Rule
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INTRODUCTION

This document provides background information and explanation for the NESCAUM Emission Performance Standards (EPS) Model Rule.* The NESCAUM Model Rule is intended to provide a model for state regulations implementing minimum standards of environmental performance for retail suppliers of electricity. It was developed by a Workgroup of staff from northeastern state air agencies, public utility commissions and energy offices. A list of Workgroup members is included as Appendix B of this document. The aim of the Workgroup was to develop a regulatory template that could be used by any state in the NESCAUM region[2] or elsewhere, while meeting the policy objectives of electric industry restructuring legislation recently adopted in Connecticut and Massachusetts. Among other things, the Connecticut and Massachusetts legislation calls for:

- "preventing, mitigating, or alleviating impacts on the resources of the commonwealth and to the health of its citizens from pollutants emitted by fossil fuel-fired electric generation facilities serving retail customers in the commonwealth" (Massachusetts G.L. Chapter 164, Section 105) and,
- "uniform performance standards for electricity generation facilities supplying power to end use customers in this state. Such standards shall, to the greatest extent possible, be designed to improve air quality in this state and to further the attainment of the National Ambient Air Quality Standards" (Connecticut Public Act No. 98-28, Section 24).

As interpreted by the Workgroup, the intent of these provisions — and hence the intent of the Model Rule — is two-fold:

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[2] For purposes of the Model Rule and this background information document the Northeast states are defined as Connecticut, Maine, Massachusetts, New Hampshire, New Jersey, New York, Rhode Island, and Vermont. These eight states are members of the Northeast States for Coordinated Air Use Management (NESCAUM), a non-profit organization that has provided technical support and a forum for regional policy coordination to the Northeast states since 1967.

1. to prevent electric utility restructuring from resulting in a degradation of air quality in the Northeast by providing a mechanism to ensure that disparities in environmental regulation do not create a competitive advantage for more polluting resources (i.e., "leveling the environmental playing field"), and
2. to improve air quality in the Northeast and to reduce the adverse impacts of electricity generation on public health and the region's environment.

Workgroup members recognized from the outset that regionally consistent implementation of EPS requirements would greatly enhance states' ability to achieve these policy objectives. Hence, an additional objective of the NESCAUM Model Rule is to facilitate the adoption and implementation of consistent EPS policies by all northeastern states.

This Background Information Document describes how the Model Rule advances the policy objectives articulated above and provides the rationale for numerous decisions made by the Workgroup in developing the Model Rule. It begins by providing background on the EPS concept and proceeds to an overview of the Model Rule, the process by which it was developed, and a summary of key provisions. These sections are followed by a specific discussion of the major issues considered by the Workgroup in the course of developing the Model Rule. Further discussion of potential EPS impacts, in both air quality and economic terms, follows the description of major issues. A final section describes next steps with respect to the adoption of state EPS regulations and continuing efforts to promote regional coordination.

The Workgroup would like to emphasize that the NESCAUM Model Rule does not implement any requirements or regulations. To implement EPS states must adopt, through a formal administrative process, their own regulations. In developing these regulations, states are free to use the NESCAUM Model Rule, or not, and to adjust or alter its provisions in any way they deem appropriate.

1.0 THE EPS CONCEPT: HISTORY AND RATIONALE

The concept of emission performance standards evolved in recent years as state and federal regulators, addressing the consequences of electric industry restructuring, sought mechanisms for assuring environmental protection in newly competitive electricity markets. Output-based performance standards could be applied to variety of entities, including an individual electric

generating facility, a generating company, or — in the case of EPS as proposed in the Model Rule — to retail electricity suppliers.

The application of EPS to retail suppliers represents a significant departure from past efforts to regulate the environmental impacts of electricity production. First, as performance standards, EPS establish emission limits in relation to the output of useful product generated, in this case electricity. By comparison, most existing emissions standards are expressed in relation to the heat input of fossil fuels used to generate electricity.[3] Second, in the Model Rule EPS are targeted to retail electricity suppliers and apply to portfolios of generation resources used to provide retail electric service to end-use customers. By comparison, most existing environmental regulations apply to individual facilities or power plants.

The chief rationale for a EPS program of the type described in the NESCAUM Model Rule is to ensure, for both environmental and competitiveness reasons, that all retail sellers of electricity face a level environmental playing field in the competitive marketplace.[4] Northeast states, while eager to embrace electric utility restructuring as a means of increasing efficiency and reducing costs, have also been eager to ensure that competition is introduced in a manner that preserves environmental quality. Recognizing the wide disparities in emissions levels that characterize existing power plants throughout the eastern US, Northeast states are concerned that, in the absence of comparable environmental requirements for all suppliers, restructuring could lead to greater reliance on lower cost but more polluting resources.[5] These concerns are particularly acute in the Northeast where serious air pollution problems are compounded by pollution transport from regions with less stringent environmental regulation.

[3] Typically pounds per million British thermal units (lbs/mmBtu).

[4] States generally lack authority to regulate wholesale electricity markets, nor do they have jurisdiction to regulate individual power plants outside their borders. With deregulation of wholesale electricity markets, electricity sold at retail in a given state may increasingly be provided by generation facilities outside that state or even outside the region.

[5] There are a number of reasons for the historically uneven application of pollution control requirements to power plants around the country. Two features of the Clean Air Act of 1977 and its subsequent amendments have been especially important. First, the Act "grandfathered" many older facilities and did not require them to meet modern pollution standards on the premise that they would be retired soon. In fact, many older plants have lasted well beyond earlier expectations. Second, with the important exception of the Acid Rain Program, the Act largely focussed on local sources and did not account for the long-range airborne transport of pollutants outside the Ozone Transport Region. Hence power plants in areas outside the Northeast largely escaped regulation despite their contribution, via airborne transport, to air quality problems in more urbanized downwind areas. Concern about the interaction of these air pollution control disparities with the deregulation of electricity markets first began to be articulated by Northeast states and others prior to the Federal Energy Regulatory Commission's (FERC) adoption, in 1996, of Order 888 establishing competition and open market access for wholesale electricity providers.

Output-based standards provide a mechanism for promoting greater efficiency in the generation of electric power regardless of plant age or historic fuel use. Their application to retail suppliers provides a mechanism for limiting the overall environmental impacts of serving retail electricity demand in a particular state, regardless of the variety and geographic location of generation resources used to serve that demand.

In late 1996, a Vermont Public Service Board Report Order contained a recommendation for output-based emission performance standards; the idea was also included in proposed state restructuring legislation. At the same time, the U.S. Environmental Protection Agency (EPA) began exploring the idea of using output-based emission limits for the regulation of nitrogen oxides (NO_x). By 1997, northeastern state environment and utility regulators, environmental advocates, and other stakeholders were discussing the potential application of emission performance standards in the context of state restructuring initiatives. In late 1997, the Massachusetts legislature passed electric utility restructuring legislation that included a provision for the implementation of emission performance standards. In April 1998, the Connecticut legislature likewise passed a restructuring bill that called for the establishment of emission performance standards. Later the same year New Jersey included a provision for emission performance standards in its restructuring legislation. (Note that in some cases, these legislative provisions refer to "*generation* performance standards" or GPS. This was also the term used in previous drafts of the NESCAUM Model Rule. However, to better reflect the intent and applicability of this model regulation, and to distinguish it from efforts to develop output-based regulations that would apply directly to electric generators, the Workgroup ultimately chose to use the term "emission performance standards". Future state regulations based on this Model Rule may revert to the term GPS, depending on the terms used in authorizing state legislation.)

The elements of proposed or existing EPS/GPS legislation in Massachusetts, Connecticut, New Jersey and Vermont are summarized below.

- The Massachusetts restructuring legislation[6] directs the Massachusetts Department of Environmental Protection (MA DEP) to develop generation performance standard(s) based on emissions per kWh for any pollutant(s) determined to be of concern to public health. A standard for at least one pollutant is to be implemented by May 1, 2003, but may be implemented earlier if at least three northeastern states adopt such a standard before 2003.

[6] Massachusetts General Law, chapter 164.

- The Connecticut restructuring legislation[7] directs the Connecticut Department of Environmental Protection (CT DEP) to establish generation performance standards for five pollutants: sulfur dioxide (SO_2), nitrogen oxides (NO_x), carbon dioxide (CO_2), carbon monoxide (CO), and mercury (Hg). The standards are to be implemented when "three of the states participating in the northeastern states' Ozone Transport Commission as of July 1, 1997, with a total population of not less than 27 million, have adopted such a standard."

- Under New Jersey legislation,[8] the Board of Public Utilities (in consultation with the New Jersey Department of Environmental Protection (NJ DEP)) may adopt and implement an emission performance standard upon finding that such standards are necessary to meet ambient air quality standards beyond federal and regional actions. However, the New Jersey legislation also requires the adoption of EPS if two other states within the Pennsylvania-New Jersey-Maryland (PJM) power control area, comprising at least 40% of retail electricity sales, adopt such standards.

- Legislation proposed in Vermont in 1996 provided for even broader application of the emission performance standard concept. The proposed legislation would have authorized the state to set standards not only for airborne emissions but for other adverse environmental effects associated with the production of electricity for sale to retail customers in Vermont.

2.0 THE NESCAUM EPS MODEL RULE

2.1 Overview and Basis for the Proposed Standards

The NESCAUM EPS Model Rule (hereafter "Model Rule") was developed in response to the legislative mandates summarized above and to widespread interest in the EPS concept. It proposes standards for three airborne pollutants commonly associated with the production of electric power: sulfur dioxide (SO_2), oxides of nitrogen (NO_x), and carbon dioxide (CO_2). In addition, it proposes a standard for mercury that is essentially a reporting requirement intended to generate the data necessary to develop an appropriate EPS value for this pollutant. A standard for carbon monoxide (CO) is referenced (in deference to the explicit requirements of the Connecticut legislation), but is "reserved" for further evaluation.

[7] Connecticut Public Act No. 98-28 ("An Act Concerning Electric Restructuring," Sub HB 5005, April 29, 1998).
[8] New Jersey Public Law 1999 chapter 23.

The proposed standards are expressed in pounds of pollution per megawatt-hour of electricity generation (lb/MWh). Compliance with the standards is determined by averaging the emissions characteristics of all generating resources associated with meeting a licensed supplier's retail load obligation for each of the electricity products[9] sold by the supplier in the EPS implementing state.[10] Compliance is determined on an annual basis, though suppliers are required to provide information on a quarterly basis. The Model Rule assumes that authority to impose EPS will be linked to a state's licensing authority over retail electricity suppliers; in other words, that suppliers will be required to comply with EPS as a condition of being licensed to do business within the implementing state.

The pollutants included in the Model Rule were chosen in part because the Connecticut restructuring legislation explicitly identifies them. In addition, these pollutants are responsible for some of the most important environmental impacts associated with electricity production.[11] Specifically, SO_2 contributes to acid deposition, fine particle pollution, and visibility impairment (haze); NO_x contributes to ozone smog formation, acid deposition, fine particle pollution, and the eutrophication of aquatic ecosystems; CO_2 is the chief pollutant identified with global climate change; and mercury is a persistent toxin that can bioaccumulate in aquatic ecosystems, thereby posing health risks to people and wildlife that consume contaminated fish

Because it is limited to certain airborne pollutants, the Model Rule does not address all the environmental impacts of electricity generation, which may also include waste disposal impacts, land use impacts, and water quality impacts. In part, these types of impacts were not addressed because they are difficult to quantify in terms of a common metric. Moreover, these impacts are for the most part site specific and may be more effectively addressed through state or local regulation.[12] By comparison, the airborne pollutants identified in the Model Rule have environmental impacts that transcend state, regional, or even national boundaries. Hence they are a logical focus for EPS regulations which seek to limit the environmental impacts of electrical

[9] The Model Rule assumes that the definition of "electricity product" for purposes of EPS implementation will be refined to be consistent with its definition under related policies, such as renewable portfolio standards and information disclosure, and with its definition under supporting regional information system(s). In its discussions, the Workgroup defines "electricity product" to represent a product offered to retail electricity customers that is distinct from other products offered by the retail supplier on the basis of price, fuel or environmental attributes.

[10] The assignment of generation resources to specific retail supplier product portfolios is achieved by an underlying information system. Alternative approaches to making such assignments are discussed in section 4.3 of this document.

[11] Carbon monoxide (CO) is a pollutant that interferes with oxygen circulation in the human body. It generally poses health risks only when emitted at ground level, and hence is not usually considered to be among the chief pollutants of concern with respect to electric generating facilities.

[12] An exception may be the radioactive waste and public safety issues surrounding nuclear electricity generation; however the Workgroup felt that these issues were outside its purview.

generation used to serve retail load in the implementing state, regardless of where that generation occurs.

Broad-based adoption of EPS limits at the levels proposed in the Model Rule could achieve significant environmental benefits since the proposed standards reflect the relatively lower emitting characteristics of the region's existing generation mix and the region's commitment to aggressive new emissions limits (in the case of NO_x), with respect to future generation. The magnitude of these benefits will depend on how competitive forces might otherwise affect the generation mix serving the Northeast's retail electricity market and is difficult to determine at this time. Ideally, policy makers would have the ability to model changes in generation patterns and emissions under competitive conditions with and without EPS requirements. In practice, however, such an analysis would be complex and highly uncertain, given the many market factors and economic and regulatory assumptions involved. An important variable would be the number of states adopting EPS and hence the size of the market affected by EPS requirements. Clearly, the impacts of EPS are greater, and the opportunities for "gaming" lower, if EPS requirements are widely and consistently implemented across a broad region.

Economic costs and benefits are similarly difficult to assess. On the one hand, EPS means that retailers will likely incur higher costs to obtain the desirable emissions characteristics associated with cleaner resources. In addition, EPS requirements will likely result in some administrative costs and reporting burdens. The magnitude of administrative costs will depend to a significant extent on the design of the information systems used to support EPS and on the degree to which centralized entities (such as power pool operators) can process and provide the data necessary for retail suppliers to demonstrate compliance. Such economic impacts are, of course, not unique to EPS; rather they are common to most forms of regulation. Regulation is nevertheless justified in many instances to avoid external costs or other unacceptable non-market outcomes. Failure to equalize environmental requirements across competitive suppliers in this instance could also result in economic inefficiency and added costs, especially if states have to offset increased pollution transport from less stringently regulated generation resources.

Given the difficulty of quantifying environmental benefits and economic costs, NESCAUM did not undertake to perform a conventional cost-benefit analysis for the EPS Model Rule. Rather, justification for the EPS values chosen rests on the primary rationale behind EPS: that is to maintain, in the deregulated market, an equal or improved level of environmental performance relative to what would otherwise be required for electricity generation serving the Northeast market. The choice of numeric standards is based, in the case of NO_x and SO_2, on emissions

levels that will be required in the Northeast under other regulatory programs, and, in the case of CO_2, on maintaining an emissions level that was recently achieved in the region. Consistent with providing for environmental improvement as well as maintenance, the Model Rule proposes to extend to the full calendar year NO_x emissions limits that will otherwise apply only in the summer and to provide for the data collection necessary to establish future limits on mercury emissions.

Two other unique features of EPS are important with respect to eventual environmental and economic impacts. First, the output-based form of the standards will promote more efficient power production. Traditional heat input-based standards provide a perverse efficiency incentive because less efficient generators are allowed a higher level of emissions commensurate with their greater fuel use.[13] EPS requirements will place a premium on generators that produce relatively less pollution per quantity of electricity output. Since most pollutant emissions are a direct consequence of fuel use, this should translate into an incentive for greater generating efficiency. Second, the application of EPS to groups of generation resources rather than individual facilities, combined with retail suppliers' flexibility to assemble different product portfolios, should allow states to reap the economic benefits of competitive power markets while advancing their environmental objectives.

2.2 Related Public Policies

In addition to EPS, northeastern states have mandated or are considering two other restructuring-related policy measures to promote clean renewable generation resources, to inform consumers about the emissions characteristics of their electricity purchases, and to verify "green" marketing claims. Connecticut, Maine, New Jersey and Massachusetts have adopted, and Vermont has proposed, renewable portfolio standards (RPS) in recent restructuring legislation. These requirements are intended to ensure that a certain percentage of retail suppliers' electricity sales are generated from renewable resources such as wind, solar, and qualifying hydropower. In addition, all northeastern states with restructuring legislation have adopted emissions information disclosure to retail customers. Disclosure is widely viewed as essential to enable consumers to make informed choices and to support claims by suppliers concerning the environmental attributes of their products.

[13] The heat input basis of most past air pollution regulation has resulted in uneven regulatory instruments that reward inefficiency. The economic drivers for fuel use, generally fuel prices, are short-term and do not reflect the long-term environmental impacts of emissions associated with fuel consumption.

Implementation of all these policies — disclosure, RPS, and EPS — is premised on the ability to assign energy (and associated fuel and environmental attributes) from generating resources to retail electricity sales at the end of a potentially long and complex chain of power market transactions. A variety of strategies for linking generation to retail sales have been proposed, including the tracking of ownership assignment and financial/contractual transactions, the creation of a secondary market in environmental attributes using "certificates" or "tags", and hybrids of these two approaches. Since information systems are not yet in place throughout the NESCAUM region, the Workgroup tried to preserve maximum flexibility in the Model Rule with respect to the approach that would eventually be used to support compliance and verification. Further discussion of these issues and of their implications for EPS implementation is found in Section 4.3 of this document.

2.3 Model Rule Development Process

Development of the NESCAUM Model Rule began in the summer of 1998. As noted in the Introduction, the Model Rule was developed by a Workgroup comprised of staff from state air quality and energy regulatory agencies throughout the NESCAUM region. NESCAUM facilitated this regional effort at the request of CT DEP, which provided a grant to NESCAUM in support of this work. A first draft of the Model Rule was completed and released for stakeholder comment in March of 1999. A regional forum introducing the Model Rule was held on March 11, 1999 and written comments on the initial draft were accepted in April of 1999. Subsequently, follow-up meetings with smaller groups of stakeholders were held in June of 1999. A second draft of the Model Rule was completed in October of 1999. After additional stakeholder review and comment, the Model Rule was approved by the NESCAUM Directors in November 1999. It was issued in final form after an additional public workshop in December 1999.

The basis for NESCAUM's involvement in this effort was a desire to enhance the effectiveness of future EPS regulation by promoting regional coordination and consistency. The need for regional consistency, both with respect to the implementation of various restructuring-related policies and with respect to the information systems that will be needed to support these policies, is recognized in the regional and even national context. It is particularly important in the Northeast given the regional nature of air pollution transport and the existence, in New England, of a single, tightly integrated bulk power system. Recognition of the importance of regional uniformity with respect to disclosure policies led the New England Conference of Public Utilities Commissioners (NECPUC) to issue a model rule for disclosure in March 1998. Coordination

with the power pools serving New York and New Jersey is likewise desirable because of the importance of power flows across these pools and between New York and New England.[14]

In sum, to be more effective and easier to implement, emission performance standards should be applied over a broad region and should be supported by comprehensive regional information systems.[15] Much as NECPUC's model rule on disclosure provided a starting point for states seeking to develop regionally consistent consumer information policies, the NESCAUM Model Rule is intended to serve as a model for the regionally consistent implementation of emission performance standards.

3.0 SUMMARY OF MODEL RULE PROVISIONS

This section summarizes key provisions of the NESCAUM EPS Model Rule. These include applicability, compliance determinations, proposed EPS values, treatment of imported power, reporting and recordkeeping requirements, enforcement measures for noncompliance, and standards review and revision.

3.1 Applicability

As stated in the Introduction, the requirements of the Model Rule apply to entities licensed to supply electricity to retail customers by the EPS-implementing state. Within a newly deregulated energy market, these entities may or may not own generating stations and may include distribution companies, aggregators for retail purposes, or third party marketers.

The Model Rule requires that each electricity product sold to retail customers in the implementing state comply with EPS. NESCAUM expects that the definition of what constitutes an electricity product will be refined as part of the development of regional information systems and will be consistent with the definition used for purposes of implementing related public policy requirements throughout the region (see Footnote 9).

[14] New York is its own power pool; New Jersey is part of the PJM (Pennsylvania-New Jersey-Maryland) pool.
[15] The more broadly emission performance standards are applied, the more environmental leverage they will exert on the existing population of electricity generators. Meanwhile, the availability of comprehensive emissions and generation information across adjoining power pools greatly reduces the uncertainties associated with the treatment of imported power (see further discussion in Section 4.3.3).

Compliance means that the weighted average annual emission rate for the total portfolio of resources associated with each electricity product is less than or equal to the EPS for each relevant pollutant. (See further discussion below.)

3.2 Compliance Determination

On a calendar year basis, retail suppliers must determine that the portfolio of generating resources associated with each of their electricity products offered at retail in the EPS implementing state complies with the standards. This is accomplished by calculating the weighted average emissions of the product portfolio, expressed in pounds per megawatt hour (MWh), and comparing the result to the standards. Performing this calculation requires information about the amount of electricity supplied by each generation resource assigned to the portfolio and about the emissions characteristics of each of those resources. The following mathematical formula describes the basic concept involved:

$$R_c = \frac{\sum_g (P_g \times E_{g,c})}{\sum_g (P_g)}$$

where: R= weighted average emissions rate of product portfolio in pounds per MWh
P = electricity supplied in MWh
E = emissions rate in pounds per MWh
g = each generation resource assigned to Electricity Product portfolio
c = regulated pollutant of concern

For ease and consistency of compliance determinations, the information needed to complete this calculation ideally will be available from a centralized and independent source, such as the independent system operator (ISO) that manages resource dispatch and financial settlements between generators and retail suppliers. As discussed further in Section 4.3, the Workgroup strongly recommends that consistent regional information systems be used to provide this information for both EPS and related public policy purposes such as information disclosure and renewable portfolio standards. In the simplified example that follows, it is assumed that the underlying information system allows for the assignment of specific generation resources and their environmental attributes to product portfolios.

The generation resource portfolio assigned to ABC Power's "Basic Power" product over the course of a year includes the following:

	Power Purchased	Emission Rate (for pollutant "c")
Generation Resource X	1000 MWh	0.4 lb/MWh
Generation Resource Y	2000 MWh	0.8 lb/MWh
Generation Resource Z	1000 MWh	1.0 lb/MWh
Total Resources	4000 MWh	

The EPS compliance calculation for ABC Power's "Basic Power" Product, with respect to pollutant "c", is as follows:

Generation Resource X	1000 MWh	x	0.4 lb/MWh	=	400 lbs of "c"
Generation Resource Y	2000 MWh	x	0.8 lb/MWh	=	1600 lbs of "c"
Generation Resource Z	1000 MWh	x	1.0 lb/MWh	=	1000 lbs of "c"

Total Emissions of Pollutant "c" = 400 + 1600 + 1000 = 3000 lbs.
Weighted Average Pollutant "c" Emissions Rate = 3000 lb/4000 MWh = 0.75 lb/MWh

Compliance Determination: 0.75 lb/MWh ≤ EPS for "c" ?

3.3 Proposed EPS Values

The Model Rule proposes the following numeric EPS levels:

Pollutant	EPS (lb/MWh)
NO_x	1
SO_2	4
CO_2	1100
Mercury	*Actual Emission Rate*
CO	*Reserved*

The basis for these values is described in Section 4.2.

3.4 Treatment of Imported Power

Treatment of imported power in the Model Rule depends on the existence of comparable information systems in the exporting region. If the exporting region has a comparable information system, the emission rates assigned by that system to the imported power are used. If it is

possible to determine the power control region of the imported power, but that region does not have a comparable information system, default emissions characteristics are assigned to the imported power, as determined by the state. If the origin of imported power cannot be determined with a sufficient degree of confidence, default emissions rates representing the combined average emissions characteristics of the East Central Area Reliability Coordination Agreement region (ECAR) and Southeastern Electric Reliability Council (SERC) regions are applied to the imported power.

3.5 Information Reporting and Recordkeeping

While the Model Rule requires an annual determination of compliance, it also includes a provision for quarterly reporting. Such reporting could allow retail suppliers and regulators to monitor environmental performance and check that product portfolios are being managed so as to ensure end-of-year compliance. Quarterly reports should include quarterly and year-to-date information on generation requirements and, if available, information on the resource mix, emissions attributes and weighted average emissions rates associated with each retail electricity product, together with any other information the state may deem appropriate.

In addition, the Model Rule requires retail suppliers to make and keep records documenting past compliance demonstrations for a period of five years.

3.6 Enforcement Measures for Noncompliance

Exceedence of the annual EPS triggers an automatic enforcement measure designed to remedy the excess emissions associated with the exceedence. Upon determining that a product portfolio exceeded the standard(s), the retail supplier is required in the following year to fully offset the excess emissions resulting from this exceedence.

For example, assume ABC Power finds at the end of the year that its "Basic Power" product exceeded the EPS for NO_x by 0.1 lbs/MWh. If the amount of generation necessary to meet ABC Power's retail load obligation for its Basic Power product over the course of that year was 4000 MWh, ABC Power must provide excess NO_x emissions reductions equal to 400 lbs (4000 MWh x 0.1 lb/MWh) the following year. ABC Power is obliged to notify the Department of the exceedence, and of the excess mass emissions reductions that must be offset, before July 1 of the following year. In special circumstances (e.g. if ABC Power no longer sells its Basic Power

product or sells to a smaller customer base the following year), the retail supplier is required to work with the state DEP to arrange an acceptable enforcement alternative.

3.7 Review and Revision of Standards

The Model Rule allows for the numeric EPS levels to be reviewed and revised over time to reflect changing market, environmental, and regulatory conditions and to maintain consistency with other pollution control programs and policies. An initial review would occur in 2003 with subsequent reviews occurring every 5 years. Any revisions to the standards would then be implemented 2 years after the review.[16] This schedule essentially allows for the review process to take one year and adds one year of lead time for retail suppliers before they must comply with a revised standard. In addition, the Model Rule provides for an overall evaluation of the EPS program by state regulators five years after implementation and every eight years thereafter.

4.0 MAJOR ISSUES

This section describes major issues considered by the Workgroup in developing the Model Rule provisions summarized above. The major issues can be grouped into four broad areas: applicability issues, determining appropriate EPS levels, information systems and gaming, and compliance flexibility.

4.1 Issues of Applicability

4.1.1. Regulated Entity: Retail Electricity Suppliers vs. Electricity Generators

Most existing air pollution control programs are directed to the owners and operators of emission sources.[17] In the judgement of the Workgroup, however, a program targeted to generators would not achieve the basic policy objectives underlying recent state legislative requirements concerning EPS. This legislation seeks to limit environmental harm caused by the generation of electricity *to serve retail or end-use customers* in the implementing state. Legislators recognized that the generators serving in-state retail customers might increasingly be located outside the state or even outside the Northeast;[18] indeed this concern is a significant

[16] Even if EPS is not implemented until close to 2003 or thereafter, the Workgroup felt it would be appropriate to review the EPS values proposed in the Model Rule by that time.

[17] Note, however, that programs regulating the retail suppliers of a product or service are not without precedent (see for example state regulations for consumer products and architectural coatings).

[18] At present, transmission constraints limit overall power imports into the New England region. However, these constraints are likely to ease as competition creates market pressure for the free flow of electricity, particularly into

reason why they felt additional environmental safeguards should accompany electric industry restructuring. If targeted to in-state electricity generators, EPS would only apply to a portion of the electricity generation used to serve the implementing state's customers. Instead, EPS is tied to states' authority to license providers of retail electric services and takes into account all generation resources associated with these services.

4.1.2. Retail Electricity Product vs. Retail Supplier Portfolio

Initially, the Workgroup proposed to apply the EPS requirement to the *overall* portfolio of generation resource attributes associated with a retail supplier's total retail load obligation in the EPS implementing state. However, this approach raised important concerns in terms of protecting consumer interests and supporting new markets for renewables and other advanced technologies. Large suppliers could separately package, and sell at a premium, those relatively low-emitting resources that are included in their portfolios for purposes of EPS compliance. This strategy could result in environmentally conscious customers subsidizing other customers under the mistaken assumption that their purchasing decisions are resulting in additional environmental benefit. Since consumer demand for green products may be limited, this strategy could also put marketers whose entire portfolio is comprised of clean resources at a considerable competitive disadvantage. That result would be of concern to a number of states that are actively seeking to promote new renewable resources through portfolio requirements and other policies.

Moreover, as a mechanism intended to facilitate environmental comparability in the competitive electricity market, the Workgroup felt it was appropriate that all products offered to retail customers should meet the same minimum standard of environmental performance. Of course, retail suppliers that wish to average over their entire resource portfolio can choose to provide just one retail electricity product (as defined for purposes of EPS compliance). Finally, in the interests of consistency with related policies, a consideration for the Workgroup was that existing restructuring legislation and regulations provide for information disclosure to consumers on a product basis.

4.1.3 Applicability to Resources within the Electricity Product Portfolio: All Resources vs. Fossil Resources Only

Another major policy question concerned which electric generation resources were to be included, for purposes of EPS, in assessing compliance for a particular electricity product. The

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regions which are presently high cost relative to other parts of the country, and as federal energy regulators continue to promote regional coordination of transmission systems.

Workgroup considered two options: (1) to include all electric generation resources without discrimination as to fuel type, or (2) to consider only the fossil fuel-fired electric generation resources in a product portfolio. After lengthy debate and input from stakeholders, the Workgroup opted to include all resources without regard to fuel type.

In reaching this decision, the Workgroup considered a number of arguments in favor of limiting EPS to fossil fuel-fired resources. One argument was that a fossil-only EPS makes sense because only fossil resources are responsible for the kinds of emissions being addressed by the model rule. Another was that a fossil-only EPS could be more readily compared to existing regulations on individual generating facilities and to the emission rates typical of fossil resources.[19] A third argument was that emission rates based on fossil units would vary less over time and across regions; whereas emission rates that reflect all resources are more variable depending on the relative contribution of nuclear, renewable, and other non-fossil resources. A final, and perhaps the most powerful, argument for a fossil-only EPS was the possibility that including all resources could function as an indirect incentive for prolonging or increasing the region's reliance on nuclear power. The Workgroup recognized that this outcome could potentially exacerbate other environmental or public health problems that are outside the Model Rule, such as concerns related to the operation and decommissioning of nuclear generators and the ultimate disposal of radioactive waste.

Ultimately, the group decided that these concerns were outweighed by several important benefits of an all-fuels approach. First, including all resources in a supplier's product portfolio is the only way to implement EPS in a manner consistent with state information disclosure and renewable portfolio requirements. In contrast, application of these policies using inconsistent representations of an electricity product will necessarily erode consumer confidence in the market for low-emitting or renewable electricity generation, reducing or eliminating the demand (and associated price signal) needed to support the growth of these resources in the Northeast. The Workgroup believes that coordinated implementation of all disclosure and portfolio requirements is necessary to achieve the energy and environmental policy objectives these mechanisms were intended to address.

Second, an all-fuels approach will promote greater fuel diversity over time and will provide retail suppliers with greater compliance flexibility since non-fossil fuel resources can be used to

[19] If the standards described in Section 4.2 were calculated using generation from fossil units only the results would be as follows: SO_2 = 7.3 lb/MWh; NO_x = 1.8 lb/MWh; CO_2 = 2010 lb/MWh. These results are numerically higher than the standards proposed in the Model Rule because the same emissions total (in the numerator) is being divided by a smaller generation figure (in the denominator).

help meet EPS requirements. By providing greater flexibility it should also reduce the costs of compliance. Moreover, the Workgroup noted that a fossil only EPS, while perhaps aimed at avoiding any indirect incentive for nuclear power, would also fail to provide any incentive for renewable and other clean, non-fossil resources. The Workgroup also felt that any indirect incentives arising from EPS requirements were unlikely to be decisive in terms of affecting the the potential for nuclear capacity additions or the retirement of existing nuclear plants.

Finally, the Workgroup recognized that overall emissions could increase substantially in the future under a fossil-only EPS. Under a fossil-only standard, suppliers could, over time, replace non-fossil resources with fossil resources, provided these met the fossil-only emission limits on average. As a result, overall emissions could increase (particularly for CO_2) even though all suppliers were fully complying with the EPS requirements. Under an all-fuels EPS, on the other hand, suppliers would need to replace non-fossil resources with other non-fossil resources and/or further limit emissions from the fossil components of their existing portfolio.[20] In this way, an all-fuels EPS can provide substantially greater environmental protection over time.

4.1.4 Applicability to Cogeneration, Landfill Gas, Waste-to-Energy, and Other Unconventional Generation Resources

The Workgroup received numerous requests to consider the unique environmental impacts and policy context for landfill gas, waste-to-energy, and other unconventional generation resources. It was noted, for example, that some of these resources have environmental benefits that are not captured in the proposed compliance determination for EPS, such as avoided greenhouse gas emissions. Because of the difficulty of reaching consensus among states about the appropriate treatment of these types of resources, the Workgroup decided to defer to individual states concerning any particular provisions that would apply to the treatment of these types of resources in future EPS regulations.

The Workgroup also received substantial input concerning the definition and treatment of cogeneration or combined heat and power systems. The Model Rule provides for pro-rata apportionment of emissions to electric energy and thermal output according to a standard Public Utilities Regulatory Policy Act (PURPA) calculation. Consistent with the current PURPA calculation, 50% of emissions are assigned to electric output in the current version of the Model

[20] The Workgroup felt it was far more likely that renewable resources or very clean fossil resources, such as natural gas turbines, would replace retiring nuclear facilities than that new nuclear units would be built.

Rule. However, the Model Rule provides for periodic review of this assumption, consistent with future revisions to the PURPA calculation.

4.1.5 Applicability to "Standard Offer" or "Default" Service

In the Model Rule development process, some stakeholders indicated concern about the potential applicability of EPS requirements to so-called "standard offer" or "default" service. These are categories of retail electric service provided for under many states' restructuring mandates to serve customers who choose to continue receiving power under a generic "standard offer" and customers who do not choose to make an affirmative selection of electricity providers. Retail suppliers subject to standard offer or default service obligations indicated that their existing commitments to state energy regulators in terms of price and other factors might hamper their ability to comply with EPS requirements. Hence, some stakeholders suggested that standard offer or default electricity service should be exempted from EPS requirements. Other stakeholders, noting that these two categories of service are likely to represent a large share of the overall retail market for some time, strongly opposed any exemption of standard offer or default service.

In general, the Workgroup shared these stakeholders' concerns that the exemption of standard offer or default service would significantly detract from the intended benefits of EPS. In addition, the Workgroup noted that existing obligations for standard offer or default service generally expire in a relatively short timeframe so that suppliers' concerns about their ability to comply with EPS under existing constraints might be moot by the time any EPS regulations actually go into effect. Hence, the Model Rule assumes that standard offer service will, in general, be considered a retail electricity product subject to EPS requirements. However, states will have the opportunity to address these and other unique issues in the context of their individual rulemaking processes for EPS.

4.2 Issues Related to Developing the EPS Standards

As discussed previously (in Section 2.1), the Workgroup did not attempt to develop numeric standards based on an analysis of the EPS levels that would be required to produce a specific quantity of emissions reductions or a specific measure of environmental improvement; nor did the Workgroup undertake a conventional cost-benefit analysis. Rather the Workgroup attempted to develop numeric standards that reflect the underlying policy purpose motivating EPS development and implementation in the Northeast. Fundamentally, that policy purpose is to

ensure, under deregulated market conditions, that the generation of power to serve the region's retail customers is characterized by an equal or improved level of environmental performance relative to what would otherwise be required of generation resources in the Northeast. Hence, the standards levels were derived from emissions levels that will be required or are already being achieved by generators in the region.

This section begins by discussing issues common to the derivation of EPS values for all of the pollutants covered by the Model Rule, before discussing specific issues pertinent to the development of numeric EPS values for individual pollutants.

4.2.1 Pollutants

The pollutants included in the Model Rule are explicitly referenced by the Connecticut Legislation (PL 98-28). They are sulfur dioxide (SO_2), oxides of nitrogen (NO_x), carbon dioxide (CO_2), carbon monoxide (CO), and mercury (Hg). The environmental rationale for limiting emissions of these pollutants is discussed further in Section 5.

In addition, the Workgroup considered the option of proposing a EPS for CO_2 only. This approach had the appeal of avoiding issues associated with the existence of separate generator-based regulatory programs for NO_x and SO_2 (see further discussion in Section 4.4). Moreover, the Workgroup recognized that CO_2 emissions are a good proxy for the other types of pollutants identified in the Model Rule because the electricity generating resources that emit less CO_2 are typically also characterized by low emissions of other pollutants.[21] This is largely because CO_2 emissions are more or less purely a function of fuel type and efficiency. The least carbon-intensive fuels, such as natural gas, generally also have low criteria pollutant emissions. Hence, regulators could have a high degree of confidence that any mix of resources designed to meet a relatively demanding CO_2 EPS would also achieve a high standard of performance with respect to other pollutant emissions.

Though the Workgroup found the concept of a CO_2-only EPS intriguing, it did not ultimately pursue this approach in the Model Rule for several reasons. First, the Connecticut restructuring legislation specifically identifies a number of pollutants in addition to CO_2. Second, the Workgroup was uncertain how a EPS for CO_2 alone, at the level proposed in the Model Rule, would function in terms of its impacts on other pollutant emissions. Nevertheless, the

[21] Note that the converse is not necessarily true. A coal-fired power plant with advanced pollution control equipment can have low emissions of NO_x and SO_2, but will still have high emissions of CO_2.

Workgroup felt that this option should be noted and might be appropriately considered in the future, depending on the status of other regulatory programs.

4.2.2 Geographic Region

An initial issue was to decide what geographic region or regions would be used to determine numeric EPS levels. Options included individual states, New England, the NESCAUM region, the Ozone Transport Region (OTR), the U.S. portion of the Northeast Power Coordinating Council (NPCC), the 22-state region that participated in EPA's Ozone Transport Assessment Group (OTAG), some other portion of the eastern U.S., or the U.S. as a whole. Ultimately, the group decided to base the standards on the eight-state NESCAUM region, which includes Connecticut, Maine, Massachusetts, New Hampshire, New Jersey, New York, Rhode Island, and Vermont.

The use state-specific EPS values would not allow for consistent regional application of EPS, and would be inconsistent with the explicit intent of Connecticut, Massachusetts, and New Jersey restructuring legislation, which recognize the regional nature of electricity distribution and supply. It would also increase the burden on suppliers (especially those who plan to operate in more than one state).

The Workgroup also considered whether separate EPS values should be developed for New England as a region, relative to New York and New Jersey (which are served by different power pools). However, the Workgroup agreed that there were significant advantages to the coordination of EPS policies beyond New England. Given the substantial interactions between the New York and New England power pools and between the New York and Pennsylvania-New Jersey-Maryland (PJM) power pools, coordination across the NESCAUM region could greatly enhance the environmental leverage exerted by EPS requirements and could significantly reduce complexities arising from the treatment of imported power. Moreover, participation by at least one non-New England state will be necessary to trigger EPS implementation in Connecticut. Thus, the group decided to base EPS values on the NESCAUM region in accordance with its objective to produce a model rule that could be consistently implemented in all eight NESCAUM states.

4.2.3 Use of Retail Sales vs. Generation in the EPS Denominator

In designating the denominator for the calculation of EPS values, the Workgroup considered two options: total retail sales in the NESCAUM region or total electricity generation in the NESCAUM region. For reasons of simplicity, the Workgroup ultimately opted to use total electricity generation rather than retail sales.

Initially the Workgroup considered dividing NESCAUM region emissions by NESCAUM region retail sales to generate EPS values, since this methodology might seem more consistent with a regulatory requirement applicable to retail electricity suppliers. However, this approach would have required an adjustment to account for the import or export of power from the region. For example, if in-region emissions were simply divided by in-region retail sales, the resulting EPS value would be too high (not stringent enough) if the region were a net exporter of power and too low (more stringent than intended) if the region were a net importer. Moreover, EPS based on retail sales might require adjustments for electrical line losses in suppliers' compliance determinations to reconcile retail sales data with associated generation. While import/export and line loss adjustments could certainly have been incorporated in the proposed EPS values, the group opted to simply use in-region emissions divided by in-region generation. This approach addresses the import/export issue, allows retail suppliers to compare directly the attributes of potential generating resources to their EPS requirements when assembling product portfolios (without the complicating issue of line losses), and is consistent with the underlying policy objective of the EPS program.

4.2.4 Cap vs. Rate-Based Standards

The Model Rule proposes standards that are rate-based; i.e. standards that are expressed in terms of an allowable quantity of emissions per quantity of electricity generated. If more electricity is generated, overall emissions can increase under a EPS program (unless, of course, a separate regulatory program such as the national Acid Rain Program limits emissions). As such, a given EPS standard will not function to "cap" emissions unless it is adjusted over time to reflect demand growth. From the standpoint of protecting the environment and improving air quality, it is desirable to limit overall emissions and not merely the rate at which emissions are being released. While the Workgroup considered whether it was possible to design a cap-based EPS, this approach requires an allocation mechanism to assign emissions budgets under the cap to the regulated entities. Given that states will not know in advance how much demand will be served by individual retail suppliers and given that many new retail suppliers are likely to enter the

marketplace, the only practicable allocation system in this case might have been an auction system. However, this approach would have put states in the position of conducting an annual auction and receiving revenues from retail suppliers, a situation the Workgroup deemed undesirable.

Rather, the Workgroup opted to build a review and revision cycle into the Model Rule that could account for changes over time, including demand growth. In light of the limitations of a rate-based approach, these provisions are crucial. The Workgroup also considered adding language in relevant sections of the Model Rule to make explicit the Workgroup's assumption that standards would be updated to maintain or reduce absolute levels of emissions, i.e. "anti-backsliding" provisions. Ultimately, however, the Workgroup decided that it was inappropriate to constrain future regulators given the variety of factors that might be pertinent to a standards revision, including the presence of other regulatory programs and changes in the status or scientific understanding of specific environmental problems. These and other considerations, together with the issue of demand growth, will have to be taken into account in periodically reviewing and revising the standards.

4.2.5 Pollutant-Specific Assumptions

The resolution of other issues, such as choice of base year or time period and consideration of other regulatory requirements, varied from pollutant to pollutant. The rationale used for establishing EPS values for each of the individual pollutants covered by the Model Rule is described below. In all cases, emissions and generation data presented in this section reflect totals for all eight NESCAUM states and include utility and non-utility generators. Figures shown for 1996 generation and emissions are from data published by the Energy Information Administration.[22]

Sulfur Dioxide (SO_2)

In developing a EPS value for SO_2, the Workgroup was guided by the most stringent SO_2 control requirements currently proposed for the electricity generating sector. These limits are

[22] Specifically, EIA's *Electric Power Annual 1997, Volumes 1 and 2.* Non-utility generator (NUG) emissions in 1996 for New Jersey and New York were estimated by multiplying total "Middle Atlantic" (NY, NJ, PA) NUG emissions (Table 62 in the *Electric Power Annual*) by each state's portion of Middle Atlantic gross NUG generation. This method is likely to overstate New Jersey and New York's NUG emissions but it does not factor into the calculation of proposed EPS values for SO_2 and NO_x because these rely on future emissions budgets under other regulatory programs. Uncertainty about NUG emissions in NY and NJ does affect the calculation of a proposed EPS value for CO_2 (see discussion for CO_2), but is probably not significant to the overall result.

to go into effect in the year 2000 under Phase 2 of Title IV (the Acid Rain Program) of the Clean Air Act.

To calculate a SO_2 EPS value for the NESCAUM region, total year 2000 Title IV SO_2 emissions allowances for generators in the NESCAUM region were divided over projected year 2000 generation in the region.[23] The relevant figures in this calculation are shown below

Year	**Emissions** thousand short tons	**Generation** GWh	**Emissions/Generation** lb/MWh
2000	610	297,251	4

The EPS proposed for SO_2 in the Model Rule is 4 lb/MWh.

While this figure is intended to reflect expected emissions rates under an existing regulatory program, the Workgroup took note of the fact that a number of states in the Northeast believe additional SO_2 reductions (*beyond* those proposed under Title IV) may be necessary to address lingering problems of acid deposition and to reduce fine particle pollution. In fact, a number of Northeast states are signatories to a regional Acid Rain Action Plan that seeks to further reduce acid deposition in the region by 50%.[24] In New York, a recent Governor's Directive would require the state's electric generators to cut SO_2 emissions a further 50% beyond current Clean Air Act requirements by the year 2007.[25] Other Northeast states are likewise exploring the potential for additional SO_2 reductions. Under the review provisions of the Model Rule, the EPS for SO_2 can be revised in the future in accordance with new regulatory or policy initiatives in the Northeast or nationally.

Oxides of Nitrogen (NO_x)

In developing a EPS value for NO_x, the Workgroup was guided by the year 2003 summertime NO_x control requirements that will apply to the northeastern Ozone Transport

[23] Projected generation in 2000 was calculated by applying an average annual growth rate of 1.5% to total 1996 generation in the NESCAUM region (280,065 GWh). This growth assumption is consistent with that used by EPA and in numerous electric industry forecasts. When the Workgroup initially did these calculations, utility and NUG generation data were not yet available for 1997. Since then, EIA has published 1997 figures which indicate that total generation in the NESCAUM region grew by 2.3% between 1996 and 1997 to a total of 286,627 GWh. Applying a 1.5% growth rate to the actual 1997 generation total would have yielded slightly higher projections for 2000 and 2003, but this difference would not have changed the proposed EPS values for SO_2 and NO_x.

[24] The regional Acid Rain Action Plan is sponsored by the Conference of New England Governors (NEGC) and Eastern Canadian Premiers and is available from NEGC at 617-423-6900 or www.tiac.net/users/negc.

Region under a 1994 Memorandum of Understanding (MOU). In 1998, EPA proposed to extend similar emissions limits to 22 eastern states as a means of addressing ozone transport under Section 110 of the Clean Air Act. As part of this action EPA developed state-by-state ozone season NO_x budgets; these were derived by applying an emissions rate of 0.15 lb/mmBTU to projected year 2003 electricity generation. Under a federal call for State Implementation Plans (SIP) to address ozone transport (hereafter "SIP call"), the new summertime NO_x limits were to go into effect by 2003 throughout the 22-state region. However, the status of these requirements is now uncertain in the wake of recent court decisions. The NESCAUM states remain committed to the 0.15 lb/mmBTU control level under the OTC MOU, which is unaffected by the federal court decision.[26]

To calculate a NO_x EPS value for the NESCAUM region, the Workgroup considered state-by-state 2003 summertime emissions budgets under both the OTC MOU and EPA's SIP call. The state budgets were summed for the NESCAUM region and adjusted to reflect an annual emissions figure.[27] The annual emissions figure was then divided by projected generation in 2003,[28] again summed over each of the NESCAUM states, to derive a EPS value. The relevant figures in this calculation are shown below:

Year	**Emissions** Thousand short tons	**Generation** GWh	**Emissions/Generation** lb/MWh
2003	159 (EPA SIP Call)	310,829	1
2003	155 (OTC MOU)	310,829	1

Based on either year 2003 OTC or SIP call budget emissions divided by projected generation, the EPS proposed for NO_x in the Model Rule is 1 lb/MWh. Note that a recent Governor's Directive to address acid deposition in the State of New York (discussed in the previous section), similarly calls for year-round NO_x reductions at OTC MOU control levels.

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[25] New York's Directive was issued by Governor Pataki on October 14, 1999. The Directive also calls for annual (not just seasonal) NOx reductions (see further discussion in next section).

[26] The Ozone Transport Region encompasses the NESCAUM states as well as Delaware, Maryland, Pennsylvania, parts of Virginia and Washington D.C. Hence, all of the NESCAUM states had already agreed to these new emissions limits prior to EPA's issuance of the Section 110 action.

[27] Since New Hampshire, Maine and Vermont were not included in the EPA SIP call, budgets for these states were taken from the OTC MOU to calculate a SIP call total for the region. The summer ozone season used by EPA is defined as the 5-month period from May to September. To adjust summertime figures to annual figures the seasonal figure is simply multiplied by 12/5.

[28] Consistent with the assumptions used to produce generation projections for 2000 in the case of SO_2, year 2003 generation was projected by applying an average annual growth rate of 1.5% to 1996 actual generation figures (see footnote 23).

Carbon Dioxide (CO_2)

In developing a EPS value for CO_2, the Workgroup considered a number of data sets, including historic (1990) emissions and generation, recent (1996) emissions and generation, and emissions levels consistent with current U.S. commitments under the so-called "Kyoto Protocol".[29] The table below shows the results of several calculations using different numerators and denominators.

The first option of dividing 1990 emissions by 1990 generation would reflect the actual emissions rate in the base year referenced by most existing international agreements. Use of these figures would imply that the mix of generating resources used in the future would be no more carbon-intensive than the 1990 base year on a pound per MWh basis. A second option, dividing 1996 emissions by 1996 generation, implies stabilizing emissions rates at a level more recently achieved in the region. The third option, 1990 emissions divided by 1996 generation, treats the 1990 emissions level as a cap with recent generation rates. A variation on this approach is the option of dividing the Kyoto goal of 1990 emissions minus 7% by 1996 generation. Finally, the Workgroup considered a fifth option: 1990 emissions minus 7% divided by projected 2010 generation. This last option reflects the emission rate that would eventually have to be achieved to meet the Kyoto targets. Not surprisingly, it resulted in the most stringent EPS.

Option	**Emissions** Thousand short tons	**Generation** GWh	**Emissions/Generation** lb/MWh
1. 1990 Emissions/1990 Generation	180,607	282,547	1278
2. 1996 Emissions/1996 Generation	159,382	280,065	1138
3. 1990 Emissions/1996 Generation	180,607	280,065	1290
4. 1990 Emissions–7% /1996 Generation	167,965	280,065	1199
5. 1990 Emissions–7% /2010 Generation*	167,965	344,972	974

* 2010 generation was projected by applying an annual demand growth rate of 1.5% to 1996 generation.

[29] The Kyoto Protocol was negotiated in Kyoto, Japan in December 1998 by nations that are Party to the International Framework Convention on Climate Change, which calls for action to prevent "dangerous human interference" in the global climate system. Under the Kyoto Protocol, the U.S. would commit to reduce its emissions to 7% below 1990 levels in the 2008-2012 timeframe. The Kyoto Protocol has not yet been ratified by the U.S. Senate.

Ultimately, the Workgroup chose the second option: 1996 emissions divided by 1996 generation. Rounding down, Option 2 yields a proposed CO_2 EPS of 1100 lbs/MWh. Given that actual emission rates in 1996 had declined by as much, if not more, than the Kyoto goals relative to 1990, the Workgroup reasoned that the EPS for CO_2 should reflect this decline. Sustaining the resulting emissions rate in the future would help to achieve the Kyoto targets as well. It is important to note that since EPS is expressed as a rate, growth in generation and retail demand will increase overall emissions into the future even under a EPS program. To implement a "hard" cap, as is envisioned by Kyoto, would require updates of the CO_2 EPS to reflect changing demand for electricity (see discussion in section 4.2.4).

The Workgroup opted not to use the most stringent option identified above (option 5), since present international agreements do not envision reaching these emissions levels until the 2008-2012 timeframe. Clearly, the CO_2 EPS will need to be reexamined in the future to ensure that it is consistent with developing regional, national and international commitments.

Carbon Monoxide

While carbon monoxide (CO) is on the list of regulated pollutants in the Connecticut EPS legislation, it is generally regarded as a pollutant associated with mobile sources.[30] Moreover, unlike the other pollutants named in the Model Rule, CO is not subject to long-range airborne transport. In fact, CO injected into the atmosphere at the height of most powerplant stacks is quickly converted to CO_2 and is not associated with documented health or environmental risks. The same is not true for carbon monoxide that enters the atmosphere at ground level, as in the case of mobile sources, which are regulated for CO emissions under a variety of state and federal programs.

It should also be noted, however, that CO has been investigated in other contexts as a potential surrogate or indicator for emissions of other pollutants (especially toxic pollutants, such as heavy metals) and as an ozone precursor. In summary, the Workgroup felt that further evaluation was needed to determine whether a performance standard for CO emissions from electricity generation was justified and, if so, to collect the data necessary to establish a standard. In the meantime, the Model Rule does not propose a numeric standard for this pollutant. Instead, the Model Rule simply identifies CO and "reserves" a standard for now.

[30] Mobile sources generally account for over 75% of CO inventories.

Mercury

Like carbon dioxide, mercury emissions from electric generating units are not currently regulated at the state or federal level. Electricity generation (particularly coal-fired generation) is known to be a major source of anthropogenic mercury emissions and certain forms of mercury are subject to long-range airborne transport. Moreover, these emissions are the subject of growing environmental and public health concern, particularly in the Northeast where high levels of mercury contamination have been found in freshwater fish throughout the region.[31] Unfortunately, good information on mercury emissions from electric generators is not consistently available nor can it be readily calculated from fuel consumption or other well-established parameters (as is the case with CO_2).

Given this lack of emissions information, the Workgroup determined that further data collection should be undertaken to ascertain the feasibility of implementing a mercury EPS, and to develop appropriate options for setting a mercury standard. To ensure that regulators will have the data needed to support a EPS for mercury in the future, the Model Rule provides for the reporting of mercury emissions and sets the effective standard equal to actual emissions.

In addition, EPA has recently announced a mercury reporting program which will provide some information that can be used to assess mercury emissions from electric generators. The EPA data request is directed to coal-fired power plants 25 MW or greater in size. While it will not apply to all facilities that eventually supply power to retail customers in the NESCAUM region, it will apply to the largest power plant emitters of mercury in the region and will provide an important source of data for state and federal regulators.

Finally, it should be noted that many of the NESCAUM states have adopted a regional Mercury Action Plan that seeks to reduce mercury emissions from electric generators and other sources by at least 50 percent by 2003.[32] Given the policy direction indicated by the NESCAUM states, it is likely that a mercury standard will be adopted as soon as the measurement and reporting tools provide adequate data to define and effectively implement a standard.

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[31] See *Northeast States and Eastern Canadian Provinces Mercury Study: A Framework for Action* (February 1998). This study is available through NESCAUM at 617-367-8540.

[32] Like the Acid Rain Action Plan, the Mercury Action Plan is sponsored by the Conference of New England Governors and Eastern Canadian Premiers and is available through NEGC. See footnote 24.

4.3 Generation and Emissions Data and Issues of "Gaming"

4.3.1 Generation Information Systems

The Model Rule would require retail suppliers to calculate weighted average emissions rates for the portfolio of generating resources associated with meeting their retail load obligation for each electricity product sold to retail customers over a calendar year compliance period. The mechanics of linking generation resource attributes to retail sales may be accomplished in different ways.[33] Workgroup members believe that regionally consistent and comprehensive information systems will be crucial to support the effective implementation and coordination of EPS, RPS, and disclosure policies across states. The development of such a system for New England is currently under discussion by the Independent System Operator for New England (ISO-NE), the New England Power Pool (NEPOOL), the New England Conference of Public Utility Commissioners (NECPUC), and NESCAUM states. These discussions are addressing a number of complex issues related to the design of generation information systems. Until the details of such systems are resolved for all the NESCAUM states, the Model Rule is written to be compatible with a range of possible information system designs.

As noted previously, at least two types of approaches to linking generation resource attributes to retail sales, as well as a hybrid of these approaches, have been proposed to date. The first involves using financial settlements data to track ownership assignment and contractual transactions between generators and retail suppliers. A detailed discussion of this approach may be found in the October 1998 report of the New England Tracking System (NETS) project.[34] The second approach involves establishing a secondary market for environmental attributes independent of financial or contractual relationships between generators and retail suppliers. Environmental attributes would be traded independently using certificates or tags issued at the point of electricity generation. A more detailed discussion of this approach may be found in a 1997 report concerning options for information disclosure by the Regulatory Assistance Project (RAP).[35] Hybrids of the financial settlements/tagging approach have also been proposed. New York, for instance, plans to use a financial settlements approach together with a secondary

[33] The need for such a link arises because it is not physically possible to track electrons from the point of generation to the point of end use.
[34] The NETS project was sponsored by the New England Governors' Conference (NEGC) with EPA funding. Copies of the NETS report are available through NEGC at 617-423-6900 or at www.tiac.net/users/negc.
[35] This report, *Uniform Disclosure Standards for New England: Report and Recommendations to the New England Utility Regulatory Commissions*, is available through RAP at 207-582-1135 or at www.rapmaine.org.

market in so-called "conversion transactions" to assign environmental attributes for the residual or spot market.[36]

4.3.2 Emissions Data

Data are, of course, key to any type of information system. In the case of EPS, both generation data (i.e. which units ran and how much power they generated) and emissions data (the quantity of different pollutants emitted by each unit) are important. Generation data are already being collected — and will continue to be collected — generally by pool operators.[37] Emissions data for some pollutants (primarily SO_2 and NO_x) are being collected by generators and are not consistently supplied to pool operators. In addition, there is considerable variation in the quality and availability of emissions data for different pollutants, different generator types, and between the U.S. and Canada.

A regional information system to support EPS and related policies could, for the most part, utilize currently available public data for the U.S. These data, including Acid Rain Program and state permitting data, are accurate enough to be used for compliance with the Model Rule. Minimum policy adjustments would be needed to centralize access to, and increase the availability and coverage of' emissions data.

In cases where such data do not exist, or exist in multiple forms for a specific generation unit, the Model Rule establishes a hierarchy of data reliability. The hierarchy places the highest level of confidence in data compiled from in-state, certified and quality-assured continuous emissions monitoring systems. Therefore, if such information exists for a generating unit, it must be used for the assignment of emission attributes. These data generally exist for sources subject to the federal Title IV Acid Rain program and state NO_x budget programs.

Under the Acid Rain Program, NO_x and SO_2 emissions data are collected from all utility-owned units with a capacity of 25 MW or greater, with some exceptions. In all, the scope of the Acid Rain Program covers 68% of the capacity in New England (many of the unaffected units are peaking units that do not operate very often). In addition, the Ozone Transport Region NO_x Budget Program, which took effect in some states in the summer of 1999, will affect all fossil fuel

[36] New York's approach is described in its Department of Public Service Opinion No. 98-19: *Opinion and Order Adopting Environmental Disclosure Requirements and Establishing a Tracking Mechanism*, issued 12/15/98. A copy of the opinion (Title: 94E0952) is available at www.dps.state.ny.us.

burning units with a capacity of 15 MW or greater and will collect NO_x data on an additional 22% of New England capacity.

If continuous monitoring data do not exist, the hierarchy looks to state approved emissions testing as the next most reliable and replicable source of data. If data are not available from this source either, the state should be consulted to find a mutually agreeable method of determining emissions data.

Finally, it should be noted that EPA has recently begun collecting unit-specific emissions data in a centralized national database known as E-GRID (Emissions and Generation Resource Integrated Database). This database, which EPA plans to update annually, may prove to be a valuable resource for emissions data in support of EPS implementation and related policies.

4.3.3 Issues of "Gaming" and the Treatment of Imported Power

A recurrent concern in Workgroup discussions throughout the Model Rule development process was the problem of "gaming"; that is, the concern that Retail Suppliers could demonstrate compliance with EPS on paper, but in ways that do not advance its underlying policy objectives. Given the physical impossibility of tracking an electron from its generation source to its end-use, the gaming problem is inherent to EPS and any related policies. For example, a retail supplier serving multiple states could simply designate the relatively cleaner resources in his portfolio for the EPS-implementing state without any effect on the overall mix of generation sources used to serve his total load obligation. The problem of gaming is particularly acute in the case of imported power, where the universe of potential sources is larger and there is likely to be even less information on actual emissions and generation. Thus, a generation company could claim to be importing "clean power" from its lower emitting resources into the Northeast, again with no effect on its overall mix and no improvement in overall emissions.

Opportunities for gaming can be substantially diminished by enlarging the size of the market affected by EPS requirements and by designing comprehensive underlying information systems to support compliance. As long as only one or two states adopt EPS, the likely market response will be to divert (on paper) cleaner resources to those states with a EPS requirement, while

[37] One issue here may be that generation by certain types of generators (e.g. generators under 1 MW in New England) is not tracked by the pool operator. In these cases, provisions will need to be made for collecting reliable generation data.

assigning the remaining mix of resources to non-EPS areas. Hence widespread adoption of consistent policies is key to maximizing the effectiveness of a EPS program.

Another important response to the problem of gaming is to promote the implementation of comprehensive information systems and their utilization in a consistent way by all participating states for disclosure and other purposes, even in states where there is no EPS requirement. If relatively lower emitting resources are being designated to meet EPS in one state, they should not also be claimed on consumer disclosure labels in another state. In short, the system should prevent any resource from being double-counted for purposes of any state policy requirement. In the Model Rule, the treatment of imported power is therefore dependent on the existence, at a minimum, of a comparable information system in the exporting region. Without such information it is impossible to have even minimal assurance that claimed resources are, in fact, not being double-counted. In these instances, the Workgroup felt it was appropriate to assign default values based on the average emissions characteristics of the exporting region. If the origin of the power cannot be identified, default values reflecting the average emissions characteristics of power control areas to the south and west of the NESCAUM region are used.

In light of existing disclosure requirements in New York, New Jersey, and several New England states, the Workgroup is optimistic that much if not all of the NESCAUM region will be covered by compatible information systems in the near future. Meanwhile, the use of default emissions rates for adjoining regions or power pools will, it is hoped, provide some incentive for the development of comparable information systems outside the Northeast.

4.4 Compliance Flexibility and Trading

Most contemporary air pollution control programs have had to address the issue of compliance flexibility and several have incorporated emission credit or allowance trading or other market mechanisms to increase flexibility and reduce the direct costs of compliance. These issues were extensively discussed by the Workgroup. The following sections describe the decisions of the Workgroup with respect to two categories of possible trading: (1) trading specifically for EPS compliance and (2) the interface between EPS and other, existing pollutant trading programs.

4.4.1 Trading and/or Banking for EPS Compliance

The Workgroup considered a number of options for including a trading or banking component as part of the EPS program. These options are summarized below.

Trading or Portfolio Averaging

One obvious possibility would be to provide for *intra*-company "trading" between products in given retail supplier's portfolio. Essentially this would amount to averaging on a company portfolio basis. As discussed in Section 4.1.2, the Workgroup felt there were important public policy justifications for requiring compliance on an individual product basis. Hence this alternative was not included in the Model Rule. Another option would be to allow for *inter*-company trading. This could take the form of allowing the averaging of specific product portfolios between two or more suppliers. Alternatively, an inter-company trading program could take the form of creating "credits" that would be issued to retail suppliers whose product portfolios achieve emissions rates below the applicable EPS standard(s). These credits could be sold to other suppliers whose product(s) would otherwise be out of compliance. However, the overall effect of inter-company trading would be similar in concept, but broader in scope, to that of company-wide averaging (in terms of undermining the policy rationale for adopting a product-based requirement in the first place). The Workgroup concluded that the ability to average within product portfolios should provide adequate flexibility, given suppliers' ability to decide how many products they will offer and how those products will be constituted out of their overall portfolio of generation resources.

Banking

Banking can offer many of the same advantages and disadvantages of trading and is often seen as an integral part of pollutant trading programs. However, in theory, a banking program can stand-alone without a trading component. In order to have a stand-alone banking program, states would need to set up the rules for creating a "commodity" or "credit" that can be banked. Such a commodity or credit might be the difference between the emissions rate achieved by a particular product and the applicable EPS requirement. In effect, this means that retail suppliers could average their product portfolio emissions characteristics across years. Ultimately the Workgroup felt that an annual compliance period provided adequate flexibility and that the EPS standards were designed to be met every year.

The two most important factors considered by the Workgroup in ruling out the inclusion of new trading, averaging, or banking schemes in the context of the Model Rule were first, the additional regulatory and administrative complexity of setting up such systems (especially against a backdrop of myriad existing pollutant trading programs targeted to generators) and second, a lack of resolution at present as to the eventual design of the regional information system(s) used to support EPS in the Northeast. Since the question of how and whether additional flexibility mechanisms should be added relates to the approach used to link generation attributes with retail sales, it seemed ill advised to propose such flexibility mechanisms before more is known about the structure of future information system(s) in the Northeast.

4.4.2 Relationship between the EPS Program and Existing Trading Programs for SO_2 and NO_x

Another important consideration for the Workgroup was the interface between the EPS program and existing NO_x and SO_2 allowance trading programs. Concern was raised that EPS implementation could interfere with the liquidity (and hence the efficiency) of these generator-based trading programs. This could occur to the extent that generators wishing to sell power to EPS-subject retail suppliers might be constrained, by the need to meet EPS, from availing themselves of the flexibility afforded by these other allowance trading programs. Other stakeholders raised the concern that failure to account for allowance use would competitively disadvantage certain generation resources. In addition to these concerns, the Workgroup considered the following hypothetical situation:

Suppose Generator A and Generator B each have NO_x budget allocations of 10 tons under the OTC NO_x Budget Program. Generator A wants to sell power to Retail Supplier X. Because Retail Supplier X is subject to EPS, Generator A emits only 8 tons of NO_x, so that Generator A's power will be more attractive to Retail Supplier X. Generator A now holds 2 tons of excess NO_x allowances that are sold to Generator B. With the additional allowances, Generator B emits 12 tons of NO_x instead of the 10 tons Generator B was originally allocated. Generator B sells power to Retail Supplier Y who is not subject to EPS. The result is an emissions shift, rather than an emissions reduction, which is not captured by the EPS system. In short, total regional emissions will tend to be governed by the generator-based cap-and-trade program rather than by EPS requirements in any situation where not all retail suppliers in the budget region are subject to EPS.

The Workgroup sought additional stakeholder input on this issue and considered a number of options for addressing the interface between existing allowance trading programs and EPS. One option, of course, was to treat these programs independently and use actual emissions at individual generating units in the EPS compliance determination, regardless of allowances held or exchanged by generators. Another option suggested by stakeholders was to exempt any generation unit subject to an existing pollutant budget program. A third option was to devise some mechanism of accounting for allowance exchanges within the EPS compliance determination. A fourth option was to permit retail suppliers to purchase and retire allowances under these other programs as an additional compliance flexibility mechanism to help meet EPS. A fifth option was to limit the EPS program to CO_2, which is not currently regulated under another air pollution control program. This last option is discussed in Section 4.2.

Exempting generation units subject to an existing pollutant budget program would mean that a large number of sources would not be covered by EPS. In addition, this option could be complicated – at least in the case of NO_x —by the possibility that sources in different regions will operate under different budgets. For instance, the fate of a broader NO_x budget program in the eastern U.S. is presently in question; if a budget program eventually applies outside the Northeast it may be at lower levels of emissions control than will be required within the region. Finally, the only pollutant for which there is currently a national, annual budget and trading program is SO_2. By comparison, existing NO_x budget programs are seasonal; i.e. they apply during the May to September ozone season. Hence the issue of an interface with the proposed NO_x EPS, which is annual, arises only in the summer months.

The Workgroup also explored the possibility of accounting for allowance exchanges in the EPS compliance determination. The only reasonable method the Workgroup could come up with for doing this was to require generators to adjust their actual emissions rate by "adding back" any excess emissions allowances sold or conversely, by subtracting any emissions allowances purchased. In the hypothetical example given above this would mean that Generator A's adjusted emissions for purposes of the EPS compliance determination would be 10 tons (8 tons actual emissions plus 2 tons of emissions allowances sold). This approach, while probably feasible to implement, would result in an added administrative burden in terms of tracking allowance trades as well as actual emissions. In addition, it raises other questions such as the problem of intertemporal trades (e.g. a generator could hold excess allowances one year when providing power to a EPS-subject retail supplier, but sell them the next year). Stakeholders who commented on the issue were generally not in favor of this approach and felt that it would create undue interference in the existing trading programs. Since stakeholders did not suggest an

alternative approach to accounting directly for allowance trading in the EPS program, the Workgroup chose not to pursue this option further.

By comparison, the fourth option – allowing retail suppliers to buy and retire allowances as a means of reducing their product portfolio emissions rates – was attractive to the Workgroup and did not appear to add undue complexity to the EPS program. By retiring allowances, a retail supplier is permanently and effectively reducing the total emissions that can be released to the atmosphere; hence, it would seem appropriate to count this reduction in the EPS calculation. In addition, this mechanism would provide retail suppliers with additional compliance flexibility.[38] It would also provide generators with the flexibility to sell excess allowances as a means of improving the environmental performance of the generation resources they are providing to the market. A few stakeholders voiced concern that this approach would drive up allowance prices and increase compliance costs for generators by creating another source of demand for allowances. However, the Workgroup noted that other entities (such as environmental organizations) are already permitted to purchase allowances. In short, the possibility that non-generating entities (such as environmental organizations or retail suppliers) might value allowances is not a reason to exclude those entities from the market but rather leads to an appropriate economic outcome in which allowance prices reflect the societal value placed on avoiding emissions. Regulatory language allowing retail suppliers to take credit in their EPS compliance determinations for retiring allowances is not included in the present draft of the Model Rule, but is included as an attachment to this Background document for comment and further consideration.

Ultimately, the Workgroup chose to base EPS compliance determinations on actual emissions only in this draft of the Model Rule and to take comment, as noted above, on the option of allowing retail suppliers to buy and retire allowances as a means of reducing their product portfolio emissions for purposes of EPS compliance.

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[38] It was suggested that, in the interests of creating additional environmental benefit in exchange for this additional flexibility, states could require that something more than 1 ton of allowances be retired to count 1 ton toward EPS compliance.

5.0 AIR QUALITY AND ENVIRONMENTAL IMPACTS

As indicated in earlier sections of this document, the airborne pollutants identified in the NESCAUM Model Rule account for some of the most important environmental and air quality impacts associated with electricity production.

Sulfur dioxide (SO_2) is regulated as a criteria pollutant based on its direct health effects as a lung irritant. In addition, SO_2 emissions are limited by a national cap and trade program because of their important role in acid deposition. Acid deposition (which can include acidic rain, snow, and fog) harms forest and freshwater ecosystems and damages buildings and agricultural crops. Despite significant emissions reductions under the federal Acid Rain Program, many northeastern states continue to experience unacceptable levels of acid deposition. This has led to calls by many Northeast states for further reductions in acid precursor emissions (see, for example, footnote 24 concerning the NEGC/Eastern Canadian Premiers' Acid Rain Action Plan). In the eastern U.S., SO_2 is also a significant contributor to the formation of fine particle pollution, which has been linked with adverse cardiopulmonary and respiratory health effects, including premature mortality and morbidity. As such, SO_2 emissions may be subject to further regulation in the future with the implementation of health-based standards for fine particles.[39] Electricity generation accounts for over two-thirds of SO_2 emissions nationwide. If all electricity generators in the 22 states covered by EPA's 1998 ozone transport SIP call met the proposed EPS of 4 lb/MWh for SO_2, annual SO_2 emissions in the SIP call region would be reduced by approximately 6.8 million tons or 64% relative to 1997 emission levels.[40]

Oxides of Nitrogen (NO_x) are presently regulated under the Clean Air Act for purposes of reducing tropospheric ozone (smog) pollution and acid deposition. Emissions of nitrogen oxides also contribute to fine particle formation and are implicated in the eutrophication of waterways throughout the eastern U.S. Problems of eutrophication are

[39] EPA proposed new health-based ambient air quality standards for fine particles and ozone in July 1997. For purposes of these standards and in current policy discussions in the Northeast and elsewhere, fine particles are generally defined as particles with a gravimetric diameter of 2.5 microns or less (PM-2.5). These standards were recently remanded by a federal circuit court. EPA is appealing the court ruling.

[40] Based on 1997 generation. Data on 1997 emissions and generation include utility and non-utility generators and were obtained from the Energy Information Administration. The SIP call region is discussed in Section 4.2.5 and includes the following states: Alabama, Connecticut, Delaware, District of Columbia, Georgia, Illinois, Indiana, Kentucky, Maryland, Massachusetts, Michigan, Missouri, New Jersey, New York, North Carolina, Ohio, Pennsylvania, Rhode Island, South Carolina, Tennessee, Virginia, West Virginia, and Wisconsin. For purposes of these calculations the remaining NESCAUM states of Maine, New Hampshire, and Vermont were also included.

a growing concern in some parts of the Northeast, which, as noted above, also continues to experience unacceptable levels of acid deposition. Hence, the Workgroup feels that the imposition of an annual NO_x EPS will provide important benefits in addition to the benefits provided by existing regulatory programs during the ozone season. Electricity generation presently accounts for approximately one-third of the national NO_x emissions inventory. If all electricity generators in the SIP call region met the proposed EPS of 1 lb/MWh for NO_x, annual NO_x emissions in the SIP call region would be reduced by over 4 million tons or 80% relative to 1997 emission levels.

Carbon Dioxide (CO_2) is the primary pollutant implicated in global climate change. Scientists predict that increasing concentrations of CO_2 and other man-made pollutants in the atmosphere could cause substantial instability and warming of global weather systems with unpredictable but potentially devastating implications for ecosystems, agriculture, human health and sea level rise. No regulatory program to control CO_2 emissions currently exists in the United States although CO_2 and other so-called "greenhouse gases" are the subject of recent international agreements on global climate change. The most recent of these agreements, adopted in Kyoto Japan in 1997, calls for the U.S. to reduce its annual emissions of greenhouse gases by 7% from 1990 levels by the 2008-2012 timeframe. The Kyoto agreement has not yet been ratified by the U.S. Senate. Nevertheless, many states and private entities are increasingly interested in exploring low-cost opportunities to reduce greenhouse gas emissions. Electricity generation accounts for approximately one third of national CO_2 emissions. The other chief source categories are transportation and energy use for space heating and industrial processes. If all electricity generators in the SIP call region met the proposed EPS of 1100 lb/MWh for CO_2, total CO_2 emissions in the SIP call region would be reduced by over 500 million tons or 32% relative to 1997 emission levels.

Mercury (Hg) is a toxic heavy metal that exists as a trace element in certain fossil fuels, especially oil and coal. Once mobilized in the environment it persists and can bioaccumulate in aquatic food chains. Upon being released to the atmosphere, airborne forms of mercury may be deposited locally or they may be transported long distances to be deposited far from the original pollution source. Some amount of emitted mercury also becomes part of a steadily growing background "reservoir" of mercury that circulates in the atmosphere on a global scale. Mercury has become the subject of growing public health concern based on evidence of contamination in some types of salt and freshwater fish and based on scientific studies that suggest that even low levels of exposure can cause

neurological and developmental impairment in the fetus and young child. In a 1997 Report to Congress, EPA identified the Northeast as one of a few regions of the country likely to experience particularly high levels of mercury deposition.[41] This finding appears to be consistent with the fact that high levels of mercury contamination have been detected in some freshwater fish throughout the region. Concern about mercury recently led to the adoption of a regional Action Plan by the New England Governors and Eastern Canadian Premiers which aims to cut mercury emissions in the region by one-half or more by 2003 (see footnote 32). Nationwide, EPA estimates that coal-fired power plants are the single largest source of anthropogenic mercury emissions. Nevertheless, electricity generators are not presently being regulated for mercury emissions. By contrast, other important sources of mercury, including municipal and medical waste combustors, are being required to sharply limit mercury emissions under recent state and federal regulations.

As discussed previously, the environmental and air quality impacts associated with implementing a EPS program are highly dependent on how many states eventually adopt such a program and on the integrity of the information systems used to support compliance and verification. In the case of SO_2 and summertime NO_x, benefits will be modest to the extent that most generators serving the region's retail load will be subject to essentially equivalent levels of control requirements under other programs. With respect to summertime NO_x, the EPS program will provide additional benefits to the extent that it applies to power imported from regions with less stringent pollution control requirements. Implementation of the Model Rule could provide substantial additional NO_x reduction benefits by extending those control levels year-round, thereby alleviating problems of water eutrophication, acid deposition, and fine particle formation as well as the summertime problem of ozone smog pollution.

CO_2 presents something of a special case in that it is a global pollutant. Any reductions achieved as a result of EPS implementation by a few states or even a region would likely be small relative to national levels of emissions and very small relative to global levels. In this context, the immediate climate protection benefits of EPS implementation would be impossible to detect. Nevertheless, the Workgroup believes that in the long term, a CO_2 EPS can have a meaningful impact on state, national, and even global emissions. First, it can ease the transition to a lower carbon regime for states and regions in the event that CO_2 is eventually regulated at the national

[41] Reasons for the predicted high rates of deposition in the Northeast may include the fact that the region has a relatively high number of medical waste combustors (note, however, that these sources are coming under stringent new regulations for mercury control) and because of the region's geographic location downwind of a large concentration of sources, especially coal-fired powerplants, in the industrial Midwest.

level, as seems likely given the growing international and scientific consensus concerning the need to limit greenhouse gas emissions. Second, if broadly adopted a CO_2 EPS could result in meaningful emissions reductions relative to the national inventory, particularly as electricity demand continues to grow and changes in the power mix (such as the retirement of nuclear units) occur. Finally, a robust CO_2 EPS can help provide market incentives for the development and commercialization of advanced technologies, such as high efficiency combustion technologies, fuel cells, and renewable resources. The benefits of accelerated commercialization and deployment of such technologies could prove quite important, even on a global scale, in the international effort to mitigate climate change.

6.0 ECONOMIC IMPACTS

The Northeast region is presently characterized by electricity costs that are among the highest in the nation. Average prices in the region range from 9.5 to 11.8 cents per kwh compared to 5.5 to 7.5 cents per kwh in neighboring regions. Assuming an average difference of 4 cents per kwh and based on current (1998) electricity demand in the NESCAUM region, this discrepancy translates into an extra regional expenditure of approximately $12 billion on an annual basis.[42] A desire to bring electricity costs more into line with those of other regions, and to capture some of these potential savings, was an important motivator for many northeastern states' eagerness to implement electric industry restructuring.

To the extent that some of the inter-regional disparity in electricity prices is due to differences in environmental regulation and to the extent that effective EPS implementation forces future retail suppliers to continue to maintain high standards of environmental performance, the savings associated with restructuring might be somewhat reduced by a EPS program. However, available data on the costs of pollution control suggest that maintaining average emissions at the levels proposed in the Model Rule should not add substantially to overall electricity costs or detract significantly from the savings promised by competitive reforms. NESCAUM recently estimated that the costs of available NO_x control technologies range from 0.1 to 0.4 cents per kwh to achieve the control levels contemplated in the OTC MOU on a year-round basis.[43] Because the existing federal Acid Rain Program already imposes national limits on SO_2 emissions, the added pollution control costs associated with the proposed SO_2 EPS are likewise expected to

[42] 1998 cost figures and retail sales data are from the EIA's *Electric Power Annual 1998*.
[43] See NESCAUM's report *Status Report on NO_x: Control Technologies and Cost Effectiveness for Utility Boilers*, June 1998.

be small. Meanwhile, the annual costs of reducing power plant mercury emissions by 70% or more are currently estimated by EPA to range from $1.7 to 1.9 billion nationally,[44] still a relatively small sum compared to national electricity expenditures.

The proposed CO_2 EPS is based on maintaining an average emissions level that was recently achieved in the region, not on a drastic reduction in current levels of emissions. Therefore the costs of meeting this standard should not be significant in the short to medium-term. Over the longer term, a broadly implemented CO_2 EPS might begin to impose more significant costs in the Northeast, particularly as nuclear units retire. Because CO_2 emissions cannot be reduced by conventional add-on control technologies, the chief options for reducing emissions are plant efficiency improvements and fuel-switching to lower carbon fuels (e.g., natural gas) or non-emitting resources (e.g., renewables). As nuclear units in the Northeast are retired, they are likely to be replaced by a mix of new natural gas facilities and new renewable capacity. The costs of renewables, though currently higher than conventional generation resources, have already declined substantially and may be expected to continue declining in the timeframe of likely nuclear retirements, particularly if state policies (such as RPS) and consumer interest succeed in stimulating market demand for these technologies. New combined cycle gas turbine costs have recently been estimated by EPA to be in the realm of 3.2 cents per kwh, suggesting that this technology will be an economic alternative for replacing retired nuclear capacity as well as some aging and/or inefficient coal and oil-fired capacity.[45] If cost nevertheless becomes an important impediment to implementation of a CO_2 EPS, state regulators may wish to consider developing additional compliance flexibility mechanisms specific to this pollutant.

In addition to any pollution control costs incurred as a consequence of EPS, there are – as with any regulatory program – administrative costs to consider. As noted previously, the magnitude of these costs will depend in significant part on the availability of a comprehensive, region-wide information system that can ease the burden of compliance demonstrations for retail suppliers and the burden of verification and enforcement for state regulators. As has also been noted previously, it is expected that the same information system(s) will be needed to implement

[44] See U.S. EPA *Analysis of Emissions Reduction Options for the Electric Power Industry*, Office of Air and Radiation, March 1999.

[45] Estimated costs assume a 400 MW capacity facility, a capacity factor of 65%, a heat rate of 6,773 Btu/kwh, a capital recovery factor of 10%, and capital costs of $617/kw (see EPA's report: *Analyzing Electric Power Generation Under the Clean Air Act Amendments*, Office of Air and Radiation, March 1998). To the extent that any nuclear capacity is replaced by natural gas combined cycle capacity, CO_2 emissions will, of course, still increase. Hence, this trend would have to be accompanied over time by reduced emissions from the existing fossil-fuel fired fleet to maintain or reduce overall CO_2 emissions levels. Note that in estimating the overall economic benefits of competition, FERC has assumed substantial efficiency improvements at existing power plants. If accurate, this should also help reduce future CO_2 emissions.

other restructuring policies such as information disclosure and RPS. If one assumes that a large number of states are committed to providing information disclosure, the marginal costs of regional information system(s) to support EPS implementation are expected to be small.

In sum, the economic impacts of EPS implementation are extremely difficult to assess since they depend on a large number of variables. Recognizing this, the Workgroup did not attempt to develop EPS levels using conventional cost-benefit analysis. However, based on the information summarized above, the Workgroup does not believe that the economic burden imposed by EPS implementation is likely to exceed the public policy benefit. An increase in certain private costs is common to most regulatory interventions and should not obscure the fact that regulatory inaction often also carries costs, even if those costs are frequently difficult to quantify.

7.0 NEXT STEPS

The NESCAUM EPS Model Rule is just that, a model. States that wish to implement EPS will need to refine the Model Rule and may wish to change or modify certain of its provisions. In developing the Model Rule the Workgroup was cognizant of certain inconsistencies in the legislative language used to describe EPS in different states' restructuring bills. While the Workgroup was careful to draft the Model Rule in ways that the group felt were consistent with a reasonable interpretation of existing legislative language, the Workgroup did not attempt to reconcile these inconsistencies in the Model Rule itself. These may be issues that individual states will need to take up.

In any case, each state will need to undertake its own formal rulemaking process to adopt EPS regulations, including, for example, public notice, hearings and other opportunities for comment. At this point, the states with a mandate to proceed toward adoption of EPS regulations are Connecticut and Massachusetts. Connecticut is required by its restructuring legislation to have regulations in place but does not need to begin implementing those regulations until certain conditions are met (see summary in Section 1.0). Massachusetts is required to implement EPS for at least one pollutant regardless of other states' action by 2003 (Massachusetts can act earlier under certain conditions).

In the meantime, the most important next step for NESCAUM and for several members of the Workgroup will be to assist and provide input to the design of a generation information system for the New England region. As noted throughout this document, the development and

consistent utilization of such a system for all restructuring policies, and its compatibility with the information systems of adjoining power pools, is crucial to the success of any future EPS program.

Questions and Comments on this document should be directed to Marika Tatsutani at NESCAUM (617-367-8540 or mtatsutani@nescaum.org). Additional copies of this document are available from NESCAUM or on the Internet at www.nescaum.org.

Appendix A

Optional Language for Allowing Retail Suppliers to Use NOx and SO2 Allowances in Determining Compliance with EPS

Allowance Use and Emission Rate Adjustment

(1) Any retail supplier may adjust the retail electricity product emission rate with SO2 and NOx allowances if the retail supplier:

(A) Procures allowances from the open market, or directly from generation resources; and

(B) Procures allowances from current year allowance allocation and shall not be used by the retail supplier or any other entity to comply with other regulatory requirements (i.e., NOx Budget or Acid Rain Programs); and

(C) Transfers allowances into a legally established Acid Rain or NOx Budget Account as appropriate; and

(D) Registers an authorized account representative in accordance with 40 CFR, Part 75 and state NOx Budget regulations [INSERT STATE CITATION], to manage the account and any allowances transferred to and from the allowance account.

(1) Each retail supplier shall calculate the adjusted retail electricity product as follows:

(A) Divide the allowances in mass emissions (tons converted to pounds) by the megawatt hours of electricity sold to retail end–users from the retail electricity product for the calendar year. The resulting value is the adjustment factor in pounds of pollutant per megawatt hour; and

(B) Deduct the adjustment factor from the weighted average emission rate of the appropriate pollutant for the retail electricity product.

(2) Once used to adjust the portfolio emission rate, allowances shall be retired from the Acid Rain or NOx Budget Systems, whichever is appropriate.

(3) The annual compliance report will provide allowance use information including the number of allowances used, the serial number of each allowance used, the pollutant, and documentation of the emission rate adjustment calculation for each retail electricity product where an allowance adjustment has been made.

(4) Allowance adjustments to the retail electricity product emission rate shall be reported in the annual compliance reporting pursuant to subsection (e)(3)(B) of this section.

Appendix B

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