Regional Haze 5-Year Progress Report:

Assessment of Reasonable Progress
Goals and Adequacy of the Existing State
Implementation Plan.

Prepared by the

Connecticut Department of
ENERGY &
ENVIRONMENTAL
PROTECTION

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Executive Summary

Regional haze is the degradation of visibility due to air pollution from both natural and anthropogenic sources. Haze causing pollutants are transported over regional areas and thereby have a degrading effect on the visibility in many of our national parks and wilderness areas.

Section 169A of the Clean Air Act (CAA) requires states to protect visibility in national parks and wilderness areas designated as Class I Federal areas. CAA section 169A also requires the U.S. Environmental Protection Agency (EPA) to set regulations for the protection of the Class I areas. In 1999, the EPA finalized the Regional Haze Rule (64 FR 35714, 40 Code of Federal Regulations (CFR) 51.300 et seq.). The rule requires states to develop plans (State Implementation Plans or SIPs) to protect and improve visibility, in collaboration with Federal Land Managers. The original SIPs were due December 17, 2007. States are also required to revise and submit a revised SIP by July 31, 2018 and every ten years after. Additionally every five years from the SIP submission, states are required to submit a progress report to evaluate the SIP's adequacy in meeting the ten year goals of the SIP. This progress report is hereafter known as the "five-year look back". Connecticut Department of Energy and Environmental Protection (DEEP) submitted the Regional Haze SIP on November 19, 2009, and EPA approved the SIP on July 10, 2014.

This report is the five-year look back, as required by 40 CFR 51.308(g). The purpose of this five-year look back is to review the adequacy of Connecticut's Regional Haze SIP for meeting the ten-year visibility goals.

The enclosed report includes:

- Timely implementation of the alternative Best Available Retrofit Technology (BART) program;
- A review of implemented control measures including a reduction in the sulfur content of fuel oil;
- A summary of continuing evaluation of other measures such as energy efficiency, alternative clean fuels, and measures to reduce emissions from wood and coal combustion;
- Emissions trends analysis; and
- Visibility trends analysis.

Connecticut has satisfied all of the control strategy commitments in the Regional Haze SIP. Furthermore, the visibility improvements in the region's Class I areas have exceeded the necessary rate of progress to meet the ten-year visibility goals. Connecticut's alternative BART program was fully implemented prior to the SIP submission in 2009 and the first phase of the low sulfur fuel program became effective July 1, 2014. The reductions already achieved from the implementation of the alternative BART program have put Connecticut well on its way to achieving the 2018 goals. Specifically, between 2001 and 2014 the alternative BART sources have reduced sulfur dioxide (SO_2) emissions by 95% and between 1994 and 2014 the alternative BART sources have reduced nitrogen oxide (NO_x) emissions by 85%. Connecticut, as a whole, has reduced its SO_2 emissions by 60% and NO_x emissions by 37% between 2002 and 2011. These emissions reductions do not take into account the impact of the low sulfur fuel program and the retirements of several of the larger alternative BART units, additional emissions reductions as recently as summer 2014. Although Connecticut has experienced a minor increase in emissions of NO_x from area sources, the visibility improvements have been even greater than the rate of progress needed to achieve 2018 goals. For example the Brigantine, NJ Class I area showed a 4.75 dv improvement between 2002 and 2012, surpassing the 2018 visibility goal (3.9dv improvement).

This report concludes that Connecticut's Regional Haze SIP is sufficient and meets the requirements of EPA's Regional Haze Rule. Thereby, DEEP submits the following review for a negative declaration. As defined by 40 CFR 51.308(h), a negative declaration indicates the existing implementation plan requires no further substantive revision at this time to achieve established goals for visibility improvement and emissions reductions.

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Section 1: Introduction

Section 169A of the Clean Air Act (CAA) requires the U.S. Environmental Protection Agency (EPA) to set regulations for the protection of visibility in national parks and wilderness areas that are designated as Class I areas. In 1999, the EPA finalized the Regional Haze Rule (RHR)[1]. The RHR requires states to develop plans (State Implementation Plans or SIPs) to protect and improve visibility in collaboration with Federal Land Managers (FLM). Connecticut Department of Energy and Environmental Protection (DEEP) submitted the Regional Haze SIP on November 19, 2009, and EPA approved the SIP on July 10, 2014.

This report is a five-year look back and is intended to review the status of the measures included in the SIP, emissions trends and the visibility trends, to determine if the SIP is adequate to meet the ten-year goals.

This introductory section describes: the purpose of this document; the background and authority of the RHR; the requirements for this periodic progress report; and the commitments to be reviewed in this report in and outside of Connecticut for the region to achieve the reasonable progress goals (RPGs).

1.1. Purpose

DEEP has prepared this report in fulfillment of 40 Code of Federal Regulations (CFR) section 51.308. DEEP has determined that no further SIP revisions are needed to meet the 2018 goal and is therefore, submitting a negative declaration.

The table below outlines the requirements of 40 CFR sections 51.308 (g)-(h) and is included for the determination of completeness of this report.

Included in this Report	Five Year Progress Report Submittal Checklist Submitted under 40 CFR 51.308 (g)-(h)		
	Regulation Citation	**Regulation Summary (*not verbatim*)**	**Location in five-year progress report or reasoning for not including in this report.**
	Report Requirements		
Y	51.308(g)(1)	Status of Control Strategies in the Regional Haze SIP: Does the report include a list of measures the state relied upon?	Section 2: Status of Connecticut Implementation Measures. Section 3: Status of Controls Outside of Connecticut

[1] 64 FR 35714, 40 CFR 51.300 et seq.

Included in this Report	Five Year Progress Report Submittal Checklist Submitted under 40 CFR 51.308 (g)-(h)		
	Regulation Citation	**Regulation Summary (*not verbatim*)**	**Location in five-year progress report or reasoning for not including in this report.**
Y	51.308(g)(2)	Emissions Reductions from Regional Haze SIP Strategies: Does the report include estimated reduction estimates for these measures?	Section 4: Emissions Inventory Trends
Y	51.308(g)(3)	Visibility Progress: Does the report include the summaries of monitored visibility data as required by the Regional Haze Rule? (*states with Class I areas only)*	Section 5: Changes in Visibility for each Mandatory Federal Class I Area in and near MANE-VU ***Note: Not required of Connecticut as, Connecticut has no Class I areas. Included for full picture of the region's visibility status.*
Y	51.308(g)(4)	Emissions Progress: Does the report provide emissions trends across the entire inventory for a 5-year period as required by the Regional Haze Rule? *(all states)*	Section 4: Emissions Inventory Trends
Y	51.308(g)(5)	Assessment of Changes Impeding Progress: Does the report include an explicit statement of whether there are anthropogenic emissions changes impeding progress? (*all states)*	Section 4: Emissions Inventory Trends
Y	51.308(g)(6)	Assessment of Current Strategy: Does the report include an assessment of whether the state's haze plan is on track to meet RPGs? *(all states)*	Section 7: Determination of Adequacy of Current Regional Haze SIP

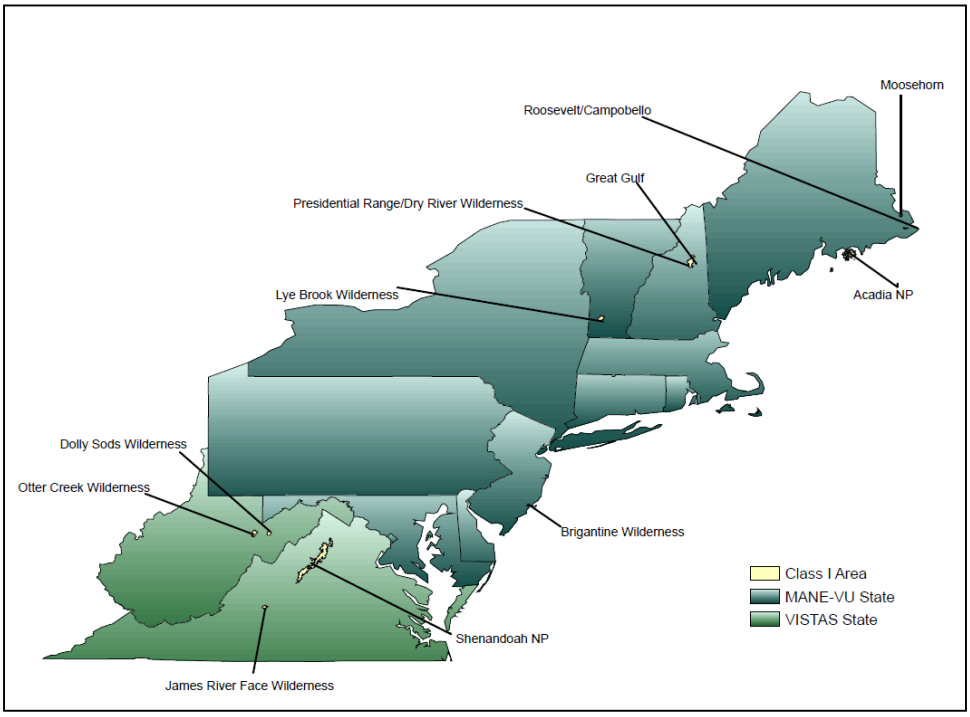
Included in this Report	Five Year Progress Report Submittal Checklist Submitted under 40 CFR 51.308 (g)-(h)		
	Regulation Citation	**Regulation Summary (*not verbatim*)**	**Location in five-year progress report or reasoning for not including in this report.**
N	51.308(g)(7)	Review of Monitoring Strategy: Does the report review the monitoring plan including any non-IMPROVE monitors the state is using? (*states with Class I areas only)*	This section is a requirement for states with Class I areas and is, therefore, not applicable for Connecticut.
Y	51.308(h)	Determination of Adequacy: Does the report (or the transmittal materials) provide the explicit determination required by the Regional Haze Rule? *(all states)*	Section 7: Determination of Adequacy of Current Regional Haze SIP

1.2. Background

The CAA requires the protection of air quality in national parks and wilderness areas. Specifically, CAA Section 169A requires the "prevention of any future, and the remedying of any existing impairment of visibility in Class I areas which impairment results from manmade air pollution."

CAA section 169A defines Class I areas as: national parks exceeding 6,000 acres; wilderness areas and national memorial parks exceeding 5,000 acres; and all international parks in existence on August 7, 1977. There are 156 Class I areas in the United States. Eleven Class I areas are in or near the Mid-Atlantic and Northeast Region (Figure 1.1).

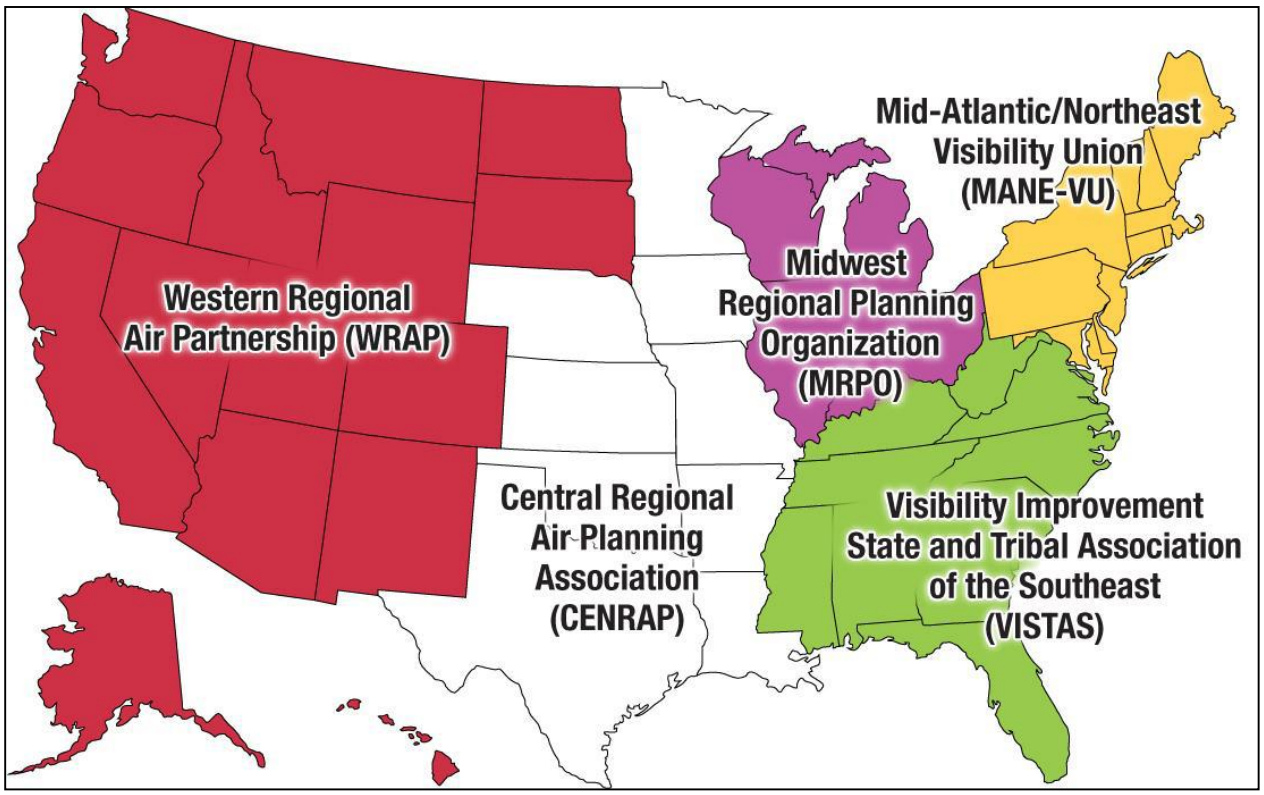
Figure 1.1. Nearby Class I Areas



The RHR is codified in 40 CFR sections 51.300-308. One of the RHR's requirements is that state, tribal and federal agencies work together to improve visibility.

EPA designated five Regional Planning Organizations (RPOs) to establish the platform to collaboratively address the visibility issue (Figure 1.2). Connecticut is a member of the Mid-Atlantic/Northeast Visibility Union (MANE-VU) RPO.

Figure 1.2. Map of U.S. Regional Planning Organizations



In 2006 MANE-VU conducted a contribution assessment study to evaluate the most effective approach for remedying the haze problem. The study determined that the predominant cause of haze pollution in MANE-VU's Class I areas is sulfate particles. These particles originate as sulfur dioxide emissions primarily from burning coal and oil to provide heat and power. Other haze contributing pollutants are emitted by power plants, boilers, furnaces, motor vehicles, other fuel-burning equipment, forest fires and other wood combustion.[2] Using these conclusions from the contribution assessment study, MANE-VU members, neighboring states, FLMs and EPA collaborated on the development of strategies to reduce haze that obscures the Class I area vistas.

Additionally, the RHR requires states to develop and implement SIPs to reduce the pollution that causes the visibility impairment. These plans establish RPGs and the emission reduction strategies needed to meet said goals. As noted above, these emissions reductions strategies were developed in a collaborative process with key stakeholders. The strategies were then adopted and implemented into Connecticut's Regional Haze SIP.

[2] See *Contributions to Regional Haze in the Northeast and Mid-Atlantic States,* NESCAUM, 2006.

1.3. Summary of the Requirements for Periodic Progress Reports

This five-year progress report is a SIP revision that fulfills the requirements of 40 CFR Part 51 sections 308(g)-(i) and 40 CFR Part 51 sections 102 and 103. The following paragraphs summarize those requirements. The primary purpose of this report is to provide an update on the status of DEEP's efforts to implement the measures in the Regional Haze SIP and determine their adequacy to meet the RPGs.

1.3.1. General and Procedural Requirements

The RHR requires each five-year progress report to be in the form of a SIP revision and comply with CAA procedural requirements. Connecticut's initial regional haze SIP was submitted on November 18, 2009[3], establishing a November 18, 2014 submission date for this five-year report. The periodic report must address the following requirements:

(1) 40 CFR section 51.102 - public hearings;

(2) 40 CFR section 51.103 - EPA submittal requirements;

(3) 40 CFR section 51.308(g) - evaluate progress towards the RPGs established in the initial SIP for each mandatory Class I Federal area located within the State and each mandatory Class I Federal area located outside the State which may be affected by emissions from within the State;

(4) 40 CFR section 51.308(h) - determine the adequacy of the existing implementation plan; and

(5) 40 CFR section 51.308(i) - provide continued coordination with other states with Class I areas impacted by Connecticut as well as consult with FLMs and EPA in order to maintain and improve the visibility in the Class I area.

1.3.2. Required Elements of the Progress Report SIP

According to 40 CFR Section 51. 308(g), a five-year progress report must contain the following elements:

(1) A description of the status of implementation of all measures included in Connecticut's Regional Haze SIP for achieving RPGs for mandatory Class I Federal areas.

(2) A summary of the emissions reductions achieved throughout the State through implementation of the measures.

(3) For states with Class I areas, a detailed assessment of visibility changes that must be made. This requirement does not apply to Connecticut because there are no Class I areas in Connecticut. However, Connecticut has included MANE-VU's assessment of the neighboring Class I areas and review of the visibility trends observed at Connecticut's Mohawk Mountain monitoring site.

(4) An analysis tracking the change over the past five years in emissions of pollutants contributing to visibility impairment from all sources and activities within the State. Emissions changes should be identified by type of source or activity.

(5) An assessment of any significant changes in anthropogenic emissions within or outside the State that have occurred over the past five years that have limited or impeded progress in reducing pollutant emissions and improving visibility.

[3] Connecticut Regional Haze Submittal November 18, 2009:
http://www.ct.gov/deep/cwp/view.asp?a=2684&Q=433312&deepNav_GID=1619

(6) An assessment of whether the current implementation plan elements and strategies are sufficient to enable the State, or other States with mandatory Federal Class I areas affected by emissions from the State, to meet all established RPGs.

(7) A review of the State's visibility monitoring strategy and any modifications to the strategy as necessary. This requirement is not applicable to Connecticut, as the state does not have any Class I areas. However, Connecticut does intend to maintain the Interagency Monitoring of Protected Visual Environments (IMPROVE) site at Mohawk Mountain in Cornwall, Connecticut.

Each of these required elements with the exception of the states monitoring strategy, as it is not applicable to states like Connecticut without a Class I area, is addressed in subsequent sections of this progress report.

1.4. Summary of MANE-VU Commitments

The RPGs adopted by the MANE-VU Class I States are based on the implementation of the regional course of action set forth by MANE-VU on June 20, 2007 in the following documents:

- "Statement of the Mid-Atlantic/Northeast Visibility Union (MANE-VU) Concerning a Course of Action within MANE-VU toward Assuring Reasonable Progress,"
- "Statement of the Mid-Atlantic/Northeast Visibility Union (MANE-VU) Concerning a Request for a Course of Action by States Outside MANE-VU Toward Assuring Reasonable Progress," and
- "Statement of the Mid-Atlantic/Northeast Visibility Union (MANE-VU) Concerning a Request for a Course of Action by the U.S. Environmental Protection Agency (EPA) toward Assuring Reasonable Progress."

These documents are known collectively as the MANE-VU Ask and are summarized in this section. The MANE-VU Ask is the set of strategies that resulted from the collaborative process described in Section 1.2 of this report. Also noted in Section 1.2 , the contribution assessment by the region determined that the primary cause of haze in MANE-VU Class I areas was sulfate particles.[4] This contribution assessment concluded that, during the baseline period, sulfate alone accounted for anywhere from one-half to two-thirds of total fine particle mass on the 20 % haziest days at MANE-VU Class I sites. Even on the 20 percent clearest days, sulfate generally accounted for the largest fraction (40 % or more) of total fine particle mass in the region. Sulfate has an even larger effect when one considers the differential visibility impacts of different particle constituents. Sulfate accounted for 70 to 82 % of estimated particle-induced light extinction at northeastern and mid-Atlantic Class I sites.

The MANE-VU Contribution Assessment also indicates that sulfur dioxide (SO_2) emissions from within MANE-VU in 2002 were responsible for approximately 25 % of the sulfate at MANE-VU Class I Areas. Sources in the Midwest and Southeast regions were responsible for about 15 to 25 percent each. Point sources dominated the inventory of SO_2 emissions. The largest source category responsible for SO_2 emissions within the point sources was determined to be electric generating units (EGUs). EPA's Clean Air Interstate Rule (CAIR) was expected to reduce emissions from EGUs by 2018. Therefore, MANE-VU's long-term strategy included additional measures to control sources of SO_2 both within the MANE-VU region and in other states that were determined to contribute to regional haze at MANE-VU Class I Areas. In addition, a special focus was given to EGUs.

[4] *Contributions to Regional Haze in the Northeast and Mid-Atlantic United States*. NESCAUM, 2006.

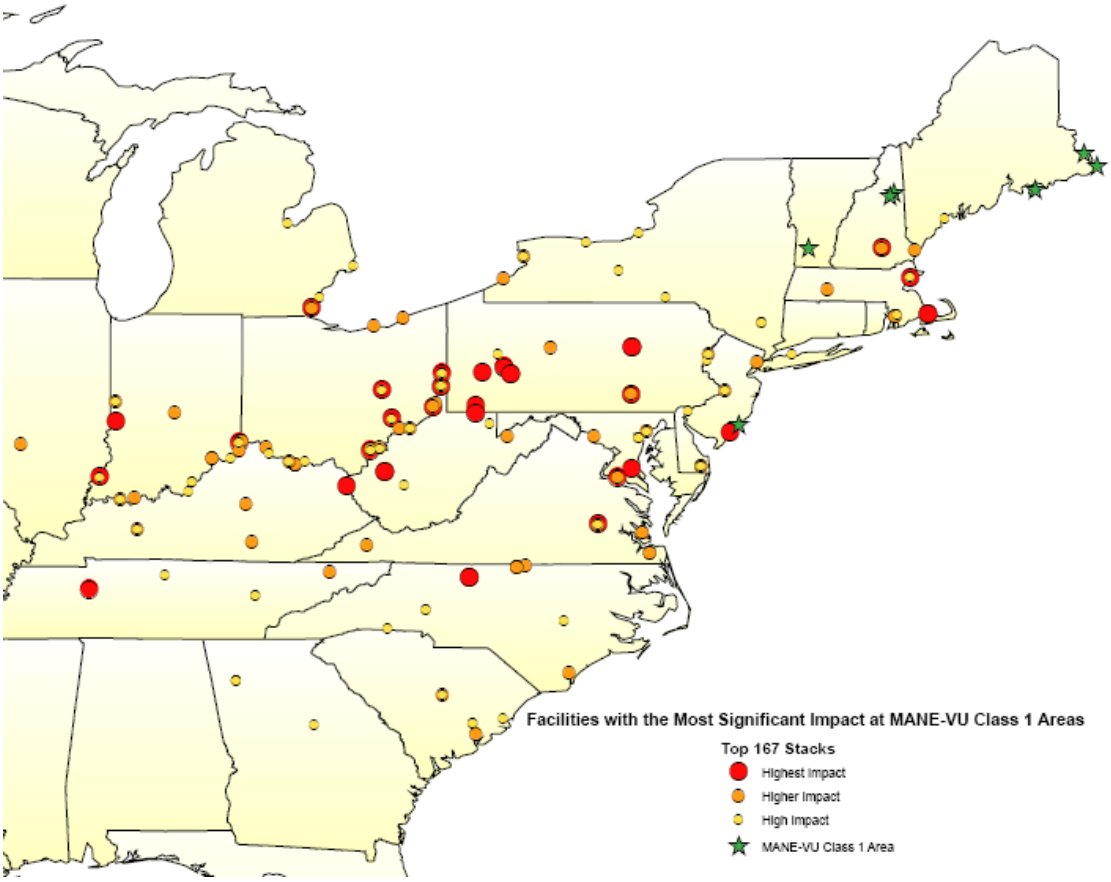
MANE-VU modeling demonstrated that the control strategies described below, in addition to on-the-books/on-the-way (OTB/OTW) measures would enable all MANE-VU Class I areas to meet their reasonable progress targets in 2018. The actions taken in response to the MANE-VU Ask are outlined in Section 2 and Section 3.

1.4.1. Requested Action within MANE-VU

On June 20, 2007, the Mid-Atlantic and Northeast States agreed to pursue a coordinated course of action designed to assure reasonable progress toward remedying the existing impairment and preventing the future degradation of visibility in mandatory Class I areas within MANE-VU. This approach would also leverage the multi-pollutant benefits that such measures may provide for the protection of public health and the environment. This course of action includes pursuing the adoption and implementation of the following emissions reduction strategies by MANE-VU states, as appropriate and necessary:

- Timely implementation of Best Available Retrofit Technology (BART) requirements; and
- A low sulfur fuel oil strategy in the inner zone States (New Jersey, New York, Delaware, and Pennsylvania, or portions thereof) to reduce the sulfur content: of distillate oil to 0.05% sulfur by weight (500 ppm) by no later than 2012, of #4 residual oil to 0.25% sulfur by weight by no later than 2012, of #6 residual oil to 0.3 – 0.5% sulfur by weight by no later than 2012, and to further reduce the sulfur content of distillate oil to 15 ppm by 2016; and
- A low sulfur fuel oil strategy in the outer zone States (the remainder of the MANE-VU region) to reduce the sulfur content of distillate oil to 0.05% sulfur by weight (500 ppm) by no later than 2014, of #4 residual oil to 0.25 – 0.5% sulfur by weight by no later than 2018, and of #6 residual oil to no greater than 0.5% sulfur by weight by no later than 2018, and to further reduce the sulfur content of distillate oil to 15 ppm by 2018, depending on supply availability; and
- A 90% or greater reduction in SO_2 emissions from each of the electric generating unit (EGU) stacks identified by MANE-VU (Appendix B) – comprising a total of 167 stacks as reasonably anticipated to cause or contribute to impairment of visibility in each mandatory Class I Federal area in the MANE-VU region (see Figure 1.3) . If it is infeasible to achieve that level of reduction from a unit, alternative measures will be pursued in such State; and
- Continued evaluation of other control measures including energy efficiency, alternative clean fuels, and other measures to reduce SO_2 and nitrogen oxides (NO_x) emissions from all coal-burning facilities by 2018 and new source performance standards for wood combustion. These measures and other measures identified will be evaluated during the consultation process to determine if they are reasonable and cost-effective.

Figure 1.3. "167 Stacks"- Facilities with Most Significant Impact at MANE-VU Class 1 Areas.



1.4.2. Requested Action Outside MANE-VU

On June 20, 2007, the MANE-VU states adopted a statement requesting that states outside of the MANE-VU region, which modeling identified as contributing to visibility impairment in the MANE-VU Class I areas, pursue a course of action to assure reasonable progress toward improvement of visibility in the MANE-VU Class I areas. This requested course of action included pursuing the adoption and implementation of the following control strategies by states outside of MANE-VU and the EPA:

- Timely implementation of BART requirements,
- A 90% or greater reduction in SO_2 emissions from each of the EGU stacks identified by MANE-VU (Appendix B) – comprising a total of 167 stacks as reasonably anticipated to cause or contribute to impairment of visibility in each mandatory Class I Federal area in the MANE-VU region (refer to Figure 1.3 for stack locations). If it is infeasible to achieve that level of reduction from a unit, alternative measures will be pursued in such State; and

- The application of reasonable controls on non-EGU sources resulting in a 28% reduction in non-EGU SO_2 emissions. This is equivalent to the projected reductions MANE-VU will achieve through its low sulfur fuel oil strategy,[5]
- States continued evaluation of other measures to reduce SO_2 and NO_x emissions from all coal-burning facilities by 2018; and
- EPA's assessment of new source performance standards for wood combustion.

1.5. Summary of Connecticut's Regional Haze SIP Submittal

On November 18, 2009 Connecticut submitted its Regional Haze SIP, which EPA approved (effective August 11, 2014).[6]

Connecticut's Regional Haze SIP submittal consisted of the following commitments:

- The demonstration of BART equivalency achieved through existing controls.
- All BART eligible and NO_x Budget/CAIR program sources would meet the recommended residual oil content or use lower sulfur content residual oil than specified in MANE-VU's low-sulfur fuel oil strategy.
- Implement sulfur limits on distillate oil for heating and off-road diesel.
- The continued evaluation of other control measures including energy efficiency and alternative clean fuels to reduce SO_2 and NO_x emissions from coal-burning facilities by 2018.
- The collaborative work with other states and FLMs to maintain the IMPROVE network, including the Cornwall site, to the extent that resources are available.

Connecticut identified seven units that qualified as BART eligible. The Regional Haze SIP submission and associated analyses determined that Connecticut's regulations and the 59 units subject to these regulations had realized greater emissions reductions than what BART would have achieved (see Section 4.2 for the demonstration of the achieved emissions reductions). Therefore, these regulatory measures were submitted as Connecticut's alternative to BART. The alternative BART measures are comprised of Regulations of Connecticut State Agencies (RCSA) Sections 22a-174-19a, 22a-174-22, 22a-174-22c and 22a-174-18.

[5] The 28 % emission reduction from non-EGU sources outside MANE-VU was intended to represent a similar emission reduction as the MANE-VU Low Sulfur Fuel Oil strategy in the areas inside MANE-VU. This strategy intentionally did not define a specific control measure. It was the intention of the MANE-VU states to enable contributing states to define how they would achieve this additional reduction in a way that is most reasonable for the sources in their state. Based on MANE-VU's initial analysis of available projection inventories for 2018, these targets were estimated at 151,000 and 308,000 tons per year reduction in non-EGU SO_2 emissions from the Midwest RPO and VISTAS RPO respectively. MANE-VU reached a consensus with the Midwest RPO during the consultation process that 131,6000 tons per year was a more accurate estimate of the magnitude of a 28 % reduction relative to their projected 2018 non-EGU SO_2 emissions of 470,000 tons per year.

[6] 79 FR 39322 (July 10, 2014).

As noted above, DEEP committed to adopt a low-sulfur fuel strategy. The strategy is implemented in two phases.[7] The first phase began in 2014 and limited the sulfur content in distillate oil #1 and #2 to 0.05% and restricted the sale of residual oil #4, #5 and #6 sulfur content to 1.0%. The second phase, beginning in 2018, will further reduce the sulfur content of residual oil to 0.3% and distillate oil further to 0.0015%.

The resulting emissions reductions and changes in visibility are noted in Section 5 and summarized in Figure 5.1a-g.

[7] RCSA Section 22a-174-19a reduced sulfur content in fuels for stationary sources of 15MW or greater and boilers or indirect heat exchangers with maximum heat input capacity of 250MMBtu/hr or more. These reductions were implemented in 2002-2003.

Section 2: Status of Connecticut Implementation Measures

The Regional Haze SIP included the commitment to implement an alternative BART program and a low sulfur fuel strategy. DEEP has met all implementation obligations and achieved the associated emissions reductions. This section of the report describes the implementation of the measures.

2.1. Status of Alternative BART

Rather than implementing BART, 40 CFR Section 51.308(e)(2), allows states to require BART sources to participate in a trading program or another alternative measure if the alternative achieves greater than reasonable progress at all sources. Connecticut's Regional Haze SIP relies on an alternative BART program. Connecticut's alternative BART program consists of the following measures:

- For SO_2: RCSA Section 22a-174-19a (Control of Sulfur Dioxide Emissions from Power Plants and Other Large Stationary Sources of Air Pollution);
- For NO_x: RCSA Section 22a-174-22 (Control of Nitrogen Oxides Emissions) and RCSA Section 22a-174-22c (CAIR NOx Ozone Season Trading Program); and
- For PM: RCSA Section 22a-174-18 (Control of Particulate Matter and Visible Emissions).

This suite of measures was effective during the five year period addressed by this report. At the time of the initial RH SIP submission, Connecticut had seven BART units: Middletown Power LLC Units 3 and 4; Fusion Paperboard (Formerly Cascades Boxboard) PFI Boiler; PSEG Power Connecticut LLC Bridgeport Harbor Station Unit 3; PSEG Power Connecticut LLC New Haven Harbor station Unit 1; Montville Power LLC Unit 6 and Norwalk Power LLC Unit 2. As explained in Section 2.1.2 not all of the original seven BART units continue to operate. DEEP's alternative BART program applies not only to the BART units, but an additional 66 units (See Figure 2.1).

2.1.1. Status of DEEP's SO_2 Alternative BART

RCSA Section 22a-174-19a was implemented in two tiers, both of which occurred prior to the RH SIP submission in 2009. The second tier, effective on January 1, 2003, requires EGUs and other large stationary sources to adhere to one of the following restrictions:

- Combust liquid fuel, gaseous fuel or a combination of each, provided that each fuel possesses a fuel sulfur limit of equal to or less than 0.3% sulfur, by weight;
- Meet an average emission rate of equal to or less than 0.33 pounds of SO_2 per MMBtu for each calendar quarter for an affected unit at a premises; or
- Meet an average emission rate of equal to or less than 0.3 pounds SO_2 per MMBtu calculated for each calendar quarter, if such owner or operator averages the emissions from two or more affected units at a premise.

In 2014, DEEP revised RCSA Section 22a-174-19a. The revisions to RCSA Section 22a-174-19a were administrative, removing the outdated and no longer applicable restrictions of the first tier.

Since the SIP submittal in 2009, fifteen new units have been added to the alternative BART program. However, the overall program still had reductions (See Appendix C for Potential and Actual Emissions). The current 73 (see Figure 2.1) total units emitted a total of 1,491 tons of SO_2 in 2011, only 4.2% of the 35,625 tons from the 53 original units in 2001 (See Figure 2.2).

Figure 2.1. Connecticut Alternative BART Unit Locations

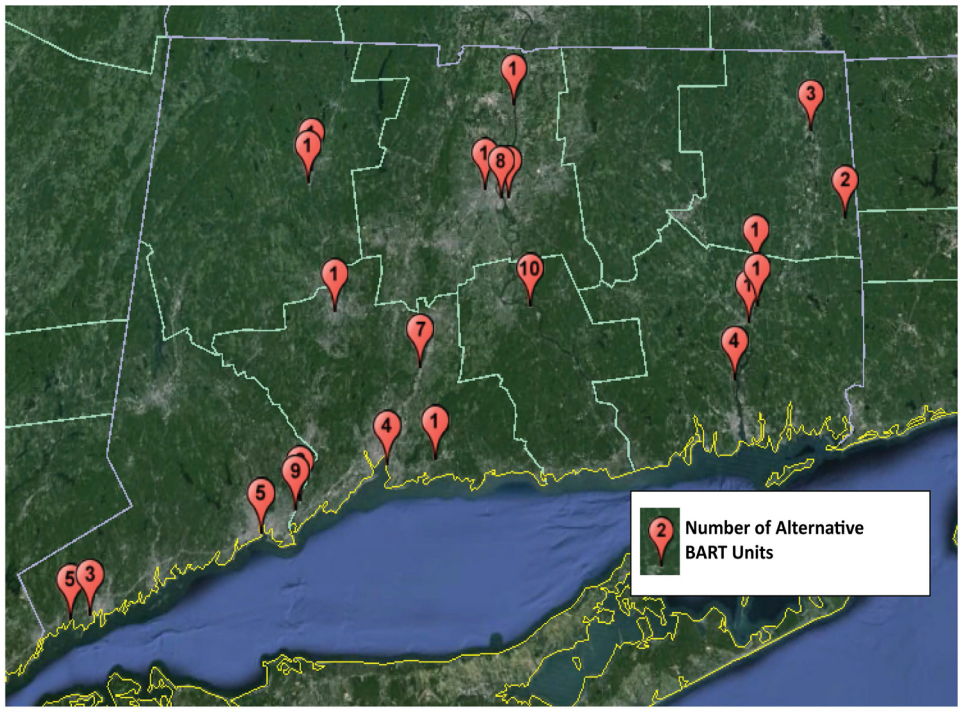
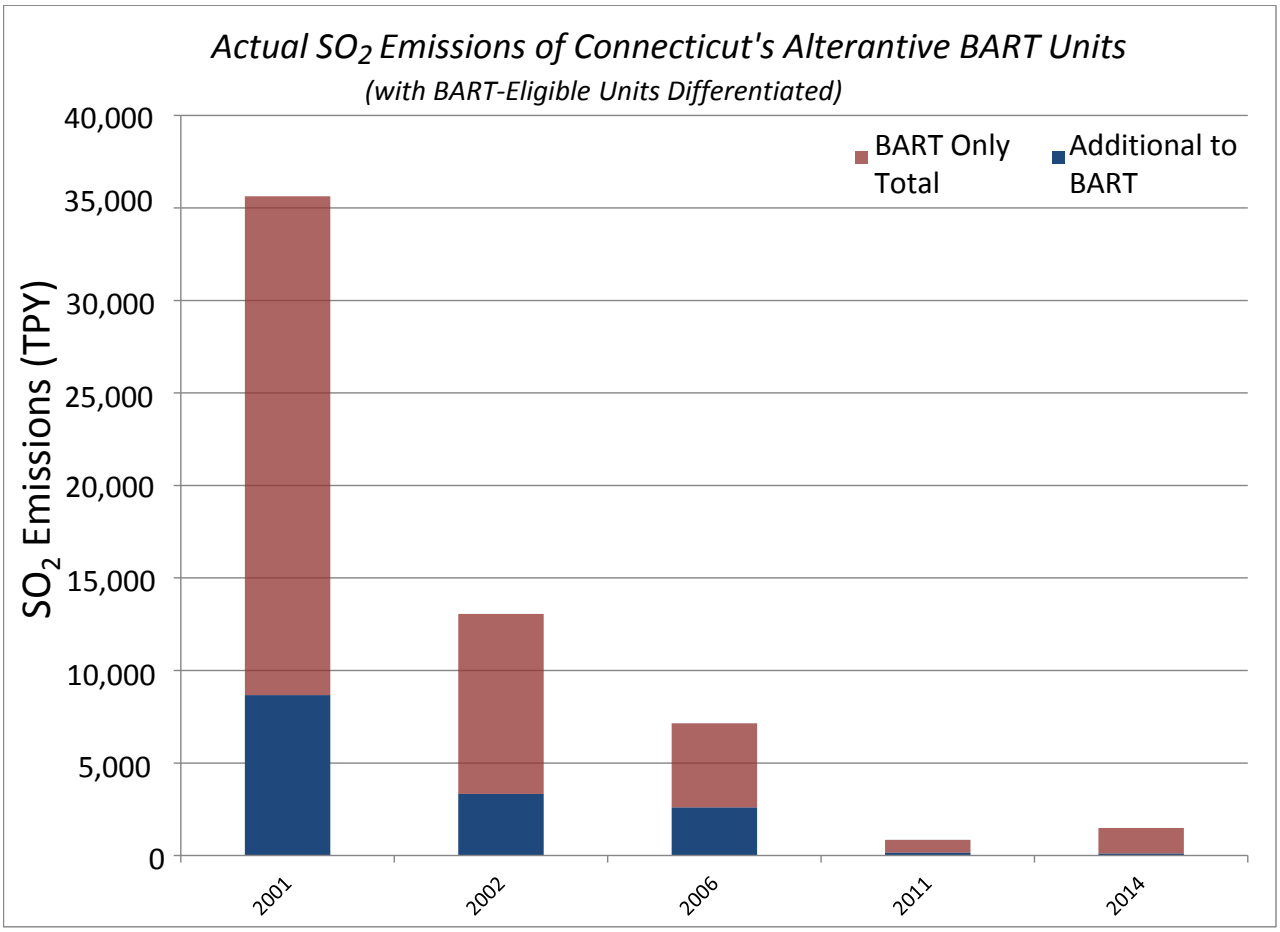


Figure 2.2. Actual SO_2 Emissions Trends for Connecticut's Alternative BART Units



As mentioned above, in section 2.1, states had the flexibility of choosing among the following options: the BART program; a trading program for BART sources; or an alternative program which would achieve equivalent or better emissions reductions. The use of the alternative BART provisions has enabled DEEP to permit new electric sources in Connecticut with a net air quality improvement. Table 2.1. displays the potential SO_2 emissions for each of Connecticut's BART-eligible units under three scenarios: the potential emissions for the five years through permitted limits or as limited in RCSA sections 22a-174-19 and 22a-174-19a; the expected potential emissions by employing MANE-VU suggestions and the potential emissions of EPA's suggested BART.[8] The full list of the alternative-BART sources potential emissions can be found in Appendix C.

[8] The net effect of Connecticut's SO_2 program is a greater emissions reduction than BART alone even though Bridgeport Harbor Station Unit 3's SO_2 limit does exceed the recommendations of MANE-VU and EPA. By expanding the program to include the sources beyond BART eligible only the program has realized an additional reduction of 43,072 tons of potential emissions.

Table 2.1. SO_2 Potential Emissions of BART-Eligible Units[9]

Bart Eligible Unit	Potential SO_2 Emissions					Percent Reduction 2001-2014	2012 Expected From BART	
	2001*	2002*	2006*	2011*	2014*		MANE-VU Recommended	EPA Recommended
*Fusion Paperboard (formerly Cascades Boxboard), PFI Boiler*****	1,325	662	662	662	662	50%	662	1,325
Middletown, 3	5,709**	5,709	3,426	3,426	3,426	40%	3,426	11,419
Middletown, 4	11,284**	11,284	6,770	6,770	6,770	40%	6,770	22,568
Montville Power LLC, 6	22,442	11,221	6,733	6,733	6,733	70%	6,733	22,442
*Norwalk Power LLC, 2****	8,557	4,278	2,567	2,567	0	100%	2,567	8,557
PSEG Power Connecticut LLC, Bridgeport, Unit 3	18,212	9,877	5,926	5,926	5,926	67%	2,694	2,694***
*PSEG Power Connecticut LLC, New Haven, 1******	20,508	10,282	6,169	6,169*****	6,169*****	70%	6,169	20,508
BART Only Total	**88,037**	**53,313**	**32,253**	**32,253**	**29,686**	**66%**		
Alternative BART Total	**150,458**	**89,308**	**60,359**	**56,930**	**49,125**	**67%**		

*Based on the lower of RCSA section 22a-174-19a regulatory limits or federally enforceable permit (New Source Review) conditions.
**Fuel sulfur limited to 0.5% in Consent Order no. 7024.
***While this level of control (95% removal or 0.15 lb SO2/MMBtu) is not required by EPA guidelines, it is recommended that such level of control be considered when determining BART.
****Additional reductions have already occurred since 2011 inventory. Norwalk Unit 2 has retired and the permit was officially revoked in late November 2013.
***** Additional reductions have already occurred since 2011 inventory. Fusion Paperboard was subject to fuel sulfur limits set in RCSA section 22a-174-19b effective July 1, 2014. In addition Fusion Paperboard shut down in fall of 2014.
******Permit revision in 2011 added the requirement of co-firing with natural gas for specified hours in ozone and non ozone season. This revision will also result in a reduction in actual emissions.

[9] The years chosen for display represent the following regulatory milestones: 2001 is the base year prior to RCSA section 22a-174-19a implementation; 2002 is the first year of phase I of RCSA section 22a-174-19a; 2006 is post the implementation of phase II of RCSA section 22a-174-19a and was five years post 2001 thus was latest year included in the 2009 SIP submittal; and 2011 is five years since 2006 and is consistent with the base year of latest modeling in development and is therefore an important year to use for consistency in comparisons.

2.1.2. Status of DEEP's NO_x Alternative BART

RCSA sections 22a-174-22 and 22a-174-22c comprise the NO_x alternative BART program.

Table 2.2 shows the reduction in potential NOx emissions from Connecticut's alternative BART program and what would have been achieved through applying only BART. The implementation of the alternative BART program has produced nearly two and half times the reductions in potential emissions of what a BART only program would have achieved (BART only = 25,581 tons reduced and alternative BART program = 62,421 tons reduced). Actual emissions have shown also achived reductions, see figure 2.3, 11,191.93 tons for the alterative BART program as a whole.

In addition, one of Connecticut's older and larger emitting sources has retired since 2014. Specifically the recent retirements include, AES Thames Units A and B, Norwalk 1 and 2, Bridgeport Harbor Station Unit 2 and Fusion Paperboard PFI Boiler.

RCSA section 22a-174-22c implemented the federal Clean Air Interstate Rule (CAIR) trading program. DEEP is currently evaluating an alternative approach to preserve the NOx reductions through CAIR.

Figure 2.3. Actual NOx Emissions Trends for Connecticut's Alternative BART Units

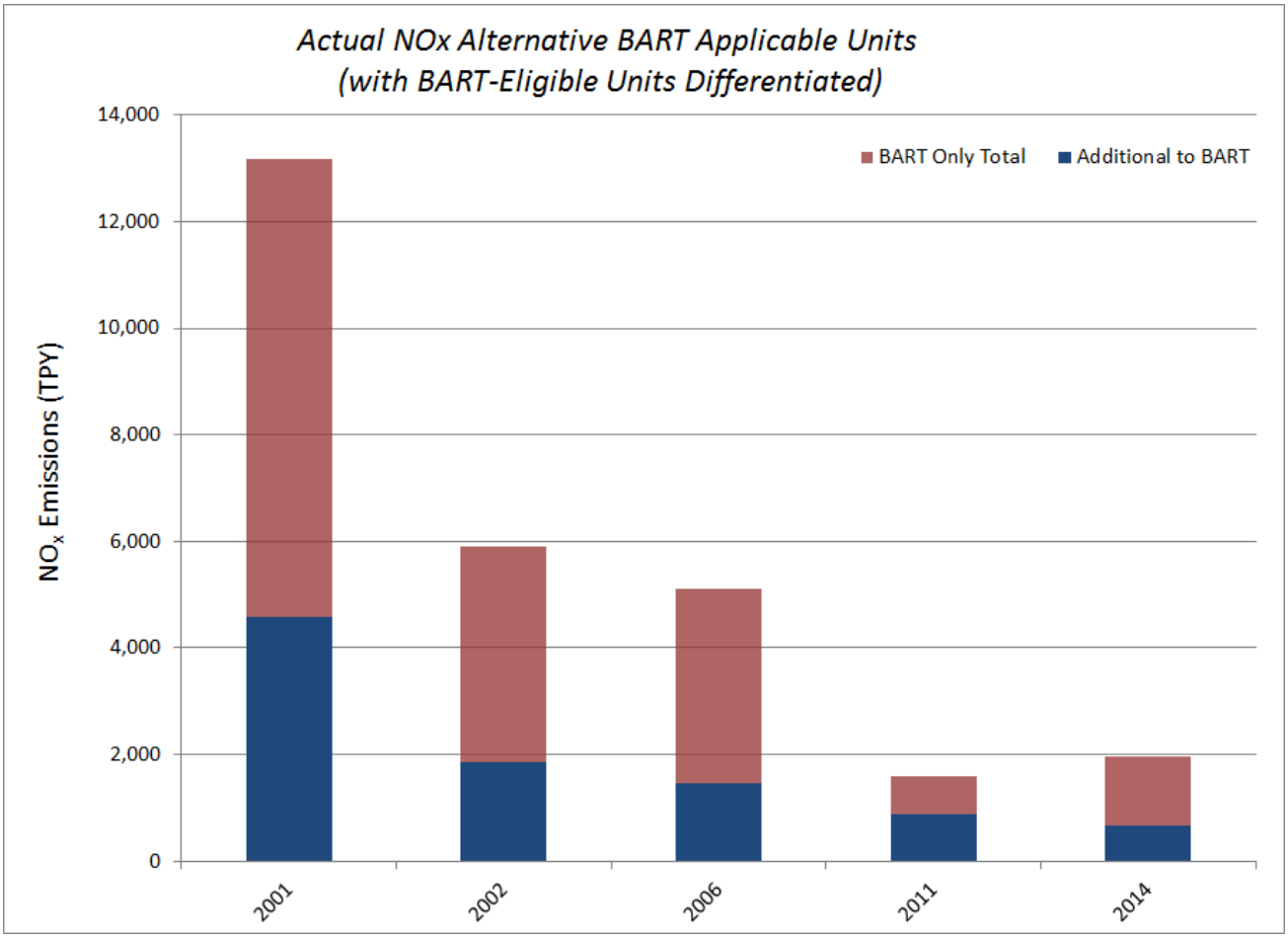


Table 2.2. Potential NO_x Emissions from BART Eligible Sources[10]

Bart Eligible Unit	Potential NOx (TPY)					Percent Reduction 1994-2014
	1994	2002	2006	2011	2014	
PSEG Power Connecticut LLC, Bridgeport, Unit 3	16,162	6,824	4,425	4,425	4,425	72.6
Middletown, 3	8,329	3,980	2,474	2,474	2,474	67.0
Middletown, 4	5,691	4,742	3,641	3,641	3,641	36.0
Montville Power LLC, 6	6,121	5,101	3,916	3,916	3,916	36.0
PSEG Power Connecticut LLC, New Haven, 1	4,661	4,661	3,588	3,588***	3,588***	23.0
Norwalk Power LLC, 2	2,334	1,945	1,493	1,493*		100.0
*Fusion Paperboard (formerly Cascades Boxboard)PFI Boiler***	361	301	231	231**	231**	36.0
BART Only Total	43,659	28,424	19,676	19,768	18,078	58.6
Alternative BART Total	89,811	46,186	34,809	33,279	27,390	69.5

*Norwalk Unit 2 has retired and the permit was officially revoked in late November 2013.
**Fusion Paperboard shut down in fall of 2014.
***Permit revision in 2011 added the requirement of co-firing with natural gas for specified hours in ozone and non ozone season. This revision will also result in a reduction in actual emissions.

[10] The years displayed in Table 2.2 above represent the following key points: 1994 is the year prior to the implementation of RCSA section 22a–174–22, 2002 was the year prior to the implementation of the non-ozone season limits, 2006 for consistency with SO_2 analysis and was last year reported in the RH SIP, and 2011 is for the five year look back.

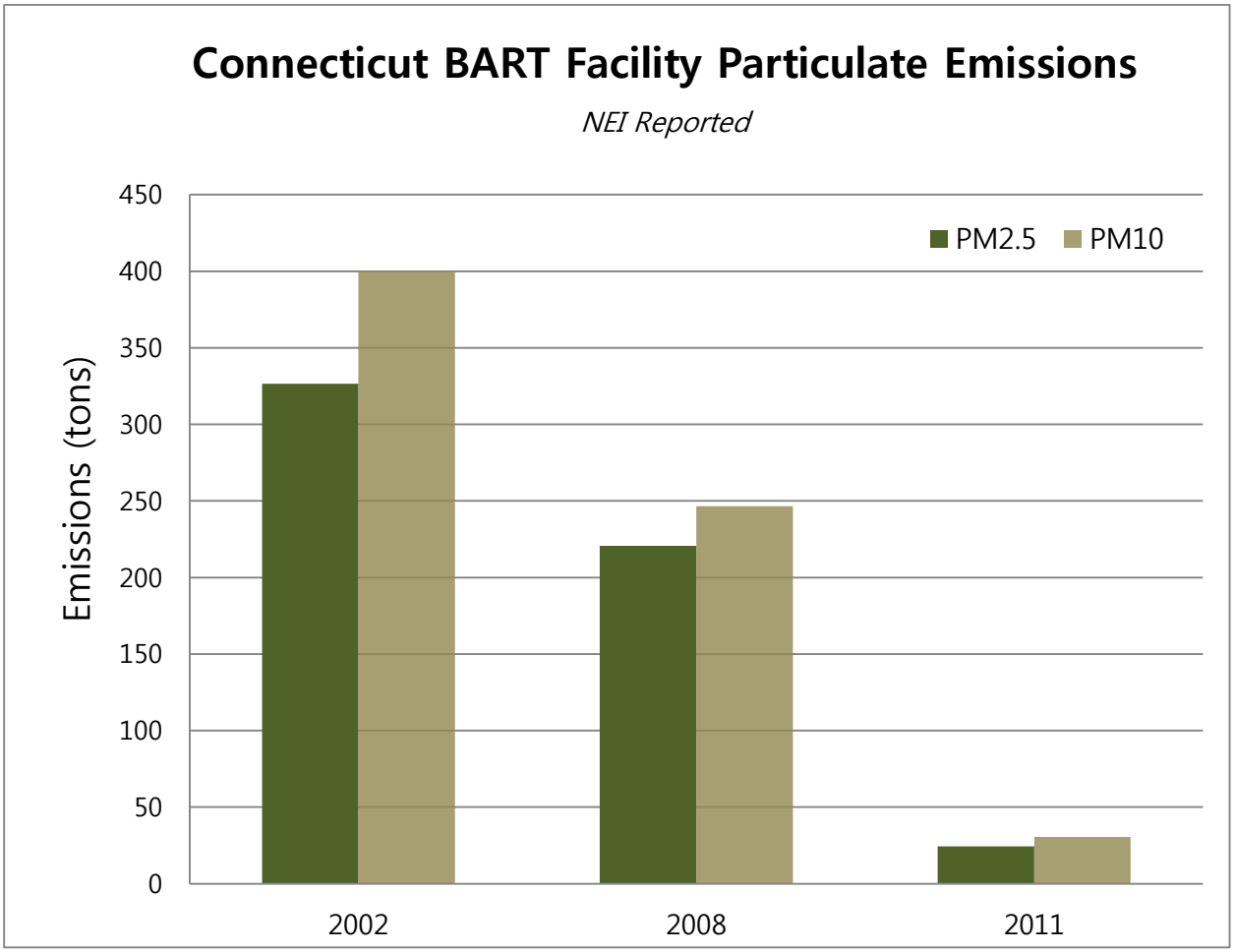
2.1.3. Status of DEEP's PM Alternative BART

The PM portion of Connecticut's alternative BART program relied on RCSA section 22a-174-18 (Control of Particulate Matter and Visible Emissions). The regulation limits the duration of mobile source idling; limits the opacity of mobile and stationary emissions; requires precautions to control particulate matter from materials transport and storage during construction or alteration of roads or buildings; sets emissions standards for incinerators, and other fuel burning engines; and sets emissions limits for industrial processes. In 2002, the MANE-VU individual source modeling showed that the Connecticut BART sources did not have a significant impact on any of the Class I areas (see Table 2.3.). In addition, from 2002 to 2011 the Connecticut BART-eligible sources emissions of both fine and course particulate matter (PM_{10} and $PM_{2.5}$) decreased by 94% (see Figure 2.4). Therefore, the SIP remains adequate in reference to PM emissions.

Table 2.3. MANE-VU modeling of individual unit emissions for 2002

Federal Class 1 area with maximum simulated impact	Highest simulated PM10 impact on 20% best days (delta-deciview) with impacting BART-eligible unit
Brigantine Wilderness	0.0000 (Middletown Unit 3)
Lye Brook Wilderness	0.0025 (Middletown Unit 4)
Acadia National Park	0.0005 (Montville Unit 6)
Brigantine Wilderness	0.0002 (Norwalk Unit 2)
Brigantine Wilderness	0.0035 (PSEG Bridgeport Unit 3)
Brigantine Wilderness	0.0012 (PSEG New Haven Unit 1)
Acadia National Park	0.0004 (Cascades PFI Boiler)

Figure 2.4. BART Facility[11] Particulate Emissions



2.2. Status of Low Sulfur Fuel Oil, Distillate Heating Oil and Non-road Heavy Duty Diesel Strategies.

The assumption underlying the MANE-VU low-sulfur fuel oil strategy is that refiners will be able, by 2018, to produce home heating and fuel oils that contain 50% less sulfur for the heavier grades (#4 and #6 residual), and a minimum of 75% and maximum of 99.25% less sulfur in #2 fuel oil (also known as home heating oil, distillate, or diesel fuel) with only a small increase in price to end users. As much as 75% of

[11] Emissions displayed are facility totals of the facilities with BART eligible units. The BART eligible units are the primary drivers of the PM reductions observed at each facility from 2002-2011, with the possible exception of Norwalk Unit 1. Norwalk Unit 1 is comparable in size to Norwalk Unit 2, which is located at the same facility, and both Norwalk units were incorporated in the alternative BART program. Thereby, similar reductions occurred at both Norwalk Unit 1 and Norwalk Unit 2. It should also be noted that both Norwalk Unit 1 and 2 retired in 2013.

the total sulfur reductions achieved by this strategy result from use of low-sulfur #2 distillate for space heating in the residential and commercial sectors.

Connecticut's low sulfur strategy is set out in RCSA sections 22a-174-19, 22a-174-19a and 22a-174-19b and CGS section 16a-21a.[12] Table 2.4 provides a summary of the sulfur content limits that apply to distillate and residual fuel oils.

Table 2.4. Connecticut Sulfur Content Limits

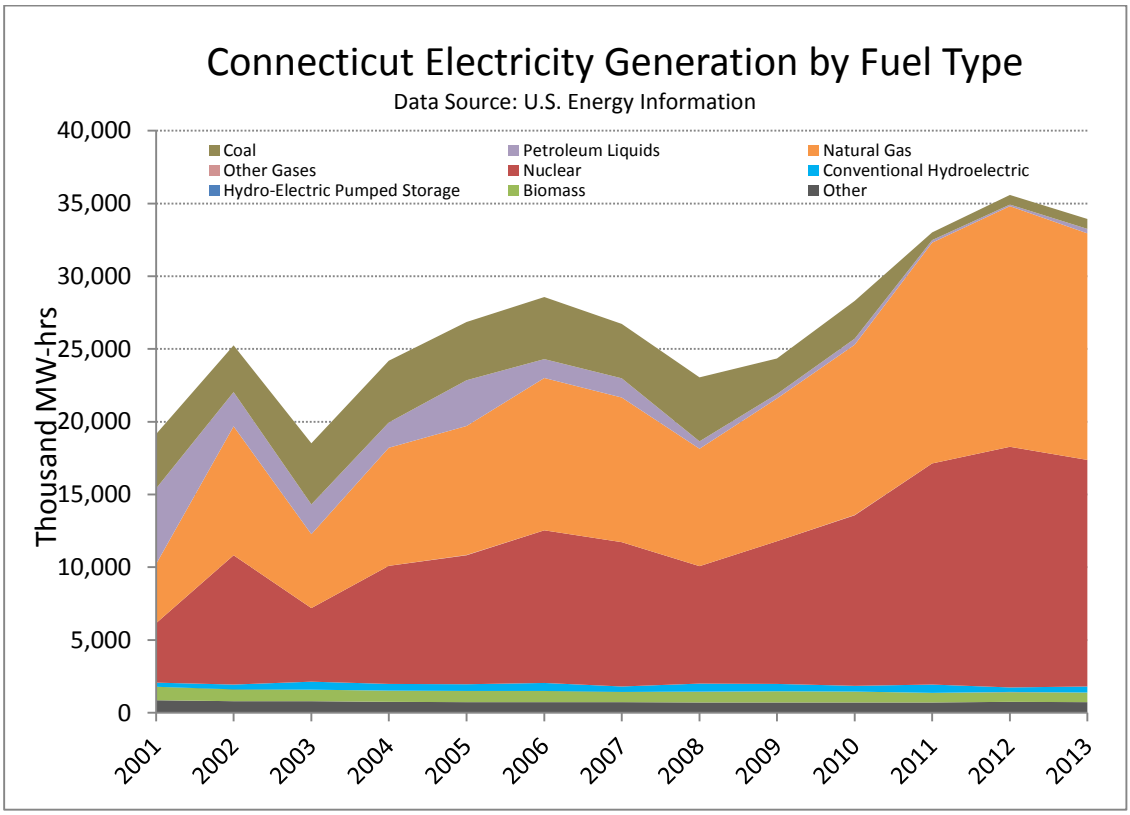
#2 Distillate Oil	• For fuel burned in stationary sources 500 ppm by 7/1/ 2014 and 15 ppm by 7/1/2018. • For fuel sold as heating oil or off- road diesel the same limits and timing listed above apply.
#4 / #6 Residual Oil	• 0.3% for EGUs subject to RCSA section 22a-174-19a. • 0.5% for industrial boilers subject to RCSA section 22a-174-19a. • 0.3% for other stationary sources subject to RCSA section 22a-174-19b as of 7/1/2018.

2.3. Evaluation and Implementation of Other Control Methods to Reduce SO_2 and NO_x from Coal Plants by 2018.

As there is only one coal fired boiler in Connecticut, PSEG Bridgeport Harbor 3, the options for additional reductions in SO2 and NOx are limited for coal EGUs. This unit is already included in the alternative BART program and therefore has made significant reductions in its emissions, as noted above. In addition in 2013, the generation produced by PSEG Bridgeport Harbor 3, in Connecticut was down 72 % from 2009, when Connecticut first committed to consider other controls for coal plants (see Figure 2.3). PSEG Bridgeport Harbor 3 mainly operates to meet peak demand or provide power when natural gas supply is curtailed. In addition, the NOx emissions rate of the PSEG Bridgeport Harbor 3 unit is among the lowest for coal units in the country, with an average rate of 0.13 lbs/MMBTU.[13] However, Connecticut DEEP is evaluating options for additional emissions reductions in NOx from coal EGUs as a part of the 2008 Ozone NAAQS RACT commitment.

[12] The 2013 legislative session passed an amendment to CGS section 16a-21a, which statute set sulfur limitations on home heating oil consistent with the MANE-VU strategy.
[13] Average derived from 2013 AMPD data.

Figure 2.5. Net Electricity Generation in Connecticut by Fuel Type, EIA 2014



2.4. Agricultural and Forestry Smoke Management

40 CFR section 51.308(d)(3)(v)(E) requires each state to consider smoke management techniques related to agricultural and forestry management in developing the long-term strategy to improve visibility at Class I areas. MANE-VU's analysis of smoke management in the context of regional haze is documented in "Technical Support Document on Agricultural and Forestry Smoke Management in the MANE-VU Region, September 1, 2006." As that report notes, fires used for resource benefits are of far less significance to the total inventory of fine-particle pollutant emissions than other sources of wood smoke in the region. The largest wood smoke source categories for the MANE-VU region, with respect to $PM_{2.5}$ emissions, are residential wood combustion (73 %); open burning (15 %); and industrial, commercial, and institutional wood combustion (9 %). Unwanted fires involving buildings and wild lands make up only a minor fraction of wood burning emissions and cannot be reasonably addressed in a SIP. Fires that are covered under smoke management plans, including agricultural and prescribed forest burning, constitute less than one percent of total wood smoke emissions in MANE-VU.

Wild fire emissions within MANE-VU states are also relatively small and infrequent contributors to regional PM emissions. However, MANE-VU Class 1 areas are occasionally impacted by wild fire smoke emissions from other regions, such as the lightning-induced forest fires that occurred in Quebec Province in July 2002. These natural wild fire smoke emissions occasionally impair visibility, but are not considered manmade or controllable but rather are part of "natural background" conditions.

As mentioned in Section 2.1.3 of this report, Connecticut's contribution of $PM_{2.5}$ to Class I areas is deemed insignificant, and no further action is needed.

2.5. Measures to Mitigate Impacts of Construction Activities

40 CFR 51.308(d)(3)(v)(B) requires each state to consider measures to mitigate the impacts of construction activities on regional haze. MANE-VU's Contribution Assessment found that particulate emissions from construction activities were a small portion of the inventory and that these emissions made up a minor fraction of fine particulates in Class I areas. While acknowledging that control strategies could decrease the effects on local air quality, it was determined that further mitigation efforts were not needed for the improvement of regional haze in Class I areas and existing rules were sufficient.

Connecticut's construction related rule was implemented in 1972 and revised in 2004.[14]

2.6. Prevention of Significant Deterioration (PSD)

Connecticut's PSD program is incorporated into the new source permitting program, RCSA section 22a-174-3a. Connecticut's PSD program applies to new major sources or major modifications that are located in areas designated as attainment of the NAAQS for each of the criteria pollutants. PSD is designed, in part, to protect visibility in Class I areas. DEEP continues to maintain increments and other PSD requirements consistent with EPA's regulations and guidelines. Furthermore, Connecticut requires minor sources to undergo a Best Available Control Technology (BACT) review under the new source review (NSR) program, therefore Connecticut's NSR program is more stringent than the minimum federal requirements.

2.7. Enforceability

Chapter 446c of the CGS grants the commissioner of DEEP the authority to create rules, issue permits and enforce laws related to regional haze. Under CGS sections 22a-171 and 22a-174, the DEEP Commissioner is authorized to enforce the state's air laws, establish a permit program, accept and administer grants, and exercise all incidental powers necessary to carry out the statutory obligations.

Specifically the sections that authorize activity to address regional haze are the following:

- CGS section 22a-174(c) , which authorizes the issuance of permits;
- CGS section 22a-174(g), which authorizes the Commissioner to collect fees to recover the costs of reviewing and acting upon permit applications and monitoring compliance with the terms and conditions of permits issued; and

[14] RCSA section 22a-174-18 addresses dust control measures and visible emissions from diesel powered mobile sources, road building and other construction activities.

- CGS section 22a-177, which establishes the legal authority for enforcement of the RCSA sections 22a-174-1 through 22a-174-200 and CGS section 22a-178, which authorizes DEEP to issue orders to correct violations of any regulation, order or permit adopted or issued under Chapter 446c (Air Pollution Control).

The Connecticut regulations provide for enforceable emission control measures and compliance schedules to meet the applicable requirements of the Clean Air Act and rules promulgated by EPA. With respect to control measures for visibility improvement under the RHR, the following enforceable provisions will apply to affected in-state BART-eligible units:

- RCSA section 22a-174-19a,
- RCSA section 22a-174-22,
- RCSA section 22a-174-22c,
- DEEP incorporates existing PM controls at the BART-eligible units into Title V permit renewals for BART purposes,
- RCSA section 22a-174-18, and
- CGS section 16a-21a.

2.8. Status of Controls on Non-EGU Point Sources

To develop the 2018 emissions inventory used for modeling conducted to help MANE-VU Class I states set RPGs, control factors were applied to the 2018 MANE-VU inventory for non-EGUs to represent national, regional, or state control measures. Table 2.5 indicates the status of implementation within Connecticut of control measures applied to non-EGU source categories. Previously, non-EGU point sources were also included in CAIR. Currently, there are no CAIR non-EGU point sources left in operation in the state of Connecticut.

Table 2.5. Status of Control Measures – Non-EGU Point Sources

Measure	Status
NO_X OTC 2001 Model Rule for ICI Boilers	Incorporated into RCSA Section 22a-174-22. [15]
2-, 4-, 7-, and 10-year MACT Standards[16]	Submitted to EPA July 17, 2014[17]
Industrial Boiler/Process Heater MACT[18]	EPA finalized December, 21, 2012

In addition, each regulation submitted under Connecticut's alternative BART program is applicable to a broader world than EGUs alone when the sources are operating in the state. This additional coverage beyond EGU's aided in the reduction of emissions that cause visibility impairment.

Table 2.6. Non-EGU Point Source Applicability of Alternative BART

Regulation	***Non-EGU Point Source Applicability Citation***
RCSA section 22a-174-18 **Control of Particulate Matter and Visible Emissions**	• RCSA section 22a-174-18(b)- Stationary Sources without Continuous Emissions Monitoring Equipment • RCSA section 22a-174-18(d)- Incinerators • RCSA section 22a-174-18(e)- Fuel burning equipment • RCSA section 22a-174-18(f)- Process Industries-General • RCSA section 22a-174-18(g)- Process Industries-Specific
RCSA section 22a-174-19a **Control of Sulfur Dioxide Emissions from Power Plants and Other Large Stationary Sources of Air Pollution**	• RCSA section 22a-174-19a(a)(2)(B) Boiler & Indirect Heat Exchangers
RCSA section 22a-174-22 **Control of Nitrogen Oxide Emissions**	• RCSA section 22a-174-22(b) Major Stationary Sources of NOx

[15] On July 17, 2014 Connecticut submitted a RACT SIP Revision, "Reasonably Available Control Technology Analysis under the 2008 8-Hour Ozone National Ambient Air Quality Standard," to EPA. These revisions propose to include NOx emissions limit reductions for ICI boilers.

[16] MACT categories and percent reduction applied are documented in table B-4 in the report, *Final TSD for MANE-VU Emission Projections, February 28, 2007, which is posted on the MARAMA web site at http://www.marama.org/publications_folder/MANEVU_Emission_Projections_TSD_022807.pdf*.

[17] See Table 4 of RACT submittal.

[18] The inventory was prepared before the MACT for Industrial Boilers and Process Heaters was vacated. Control efficiency was assumed to be 4 percent for SO2 and 40 percent for PM. EPA revised and re-adopted the MACT with some changes. The overall effects of including these reductions in the inventory are estimated to be minimal.

2.9. Controls on Area Sources Expected by 2018

RCSA section 22a-174-19b limits the sulfur content of all fuel sold in the state for combustion in stationary sources for purposes other than space heating and therefore impacts area sources. Home heating oil and off-road diesel fuel sulfur content is restricted under CGS section 16a-21a. See section 2.2 of this report for more detail.

2.10. Mobile Sources

DEEP has adopted California's Low Emission Vehicle (LEV) program and the subsequent amendments, the most recent being the adoption of LEV II and LEV III on August 1, 2013. The latest amendments require the use of California standards for air pollution control equipment and testing, and enable four new emissions categories.[19] A Northeast States for Coordinated Air Use Management (NESCAUM) report estimated that LEV II alone would produce a 9.7 tpd (or 15.2%) reduction of NO_x in CT, NJ and RI combined by 2025.[20]

2.11. Assessment of DEEP Control Strategies

40 CFR section 51.308(g)(1) requires states to review the status of controls addressed in the state implementation plans. As described in this chapter Connecticut implemented RCSA sections 22a-174-18, 22a-174-19a, 22a-174-19b, 22a-174-22, 22a-174-22c and CGS section 16a-21a. These regulations, statutes and associated emissions limit and caps have been implemented in the timeframe described in the SIP commitment. Furthermore, as explained in Section 1 of this report, the emissions have decreased in a manner adequate under the RPGs.

[19] See http://www.ct.gov/deep/cwp/view.asp?A=2684&Q=398686 for the overview of Connecticut's LEV II Program.

[20] Summary of NESCAUM Analysis Evaluating the NOx, HC, and CO Emission Reduction Potential from Adoption of the California Low Emission Vehicle (LEV II) Standards. NESCAUM, 2005.

Section 3: Status of Controls Outside of Connecticut

The regional nature of haze causing pollutants and the required collaboration of the regional haze process suggests that a review of the control strategy implementation beyond Connecticut's borders is an important component of this report. Therefore, this section describes that status, of the strategies committed to within MANE-VU; outside MANE-VU and federal strategies that have and will reduce haze causing pollutants.

3.1. MANE-VU States

As mentioned previously, the primary strategy employed by MANE-VU was the reduction of SO_2 emissions by targeting the largest sources (i.e. EGUs) and implementing a low sulfur fuel strategy. Table 3.1 summarizes the implementation of EGU emission controls in MANE-VU states other than Connecticut. State implementation of the low sulfur fuel strategy, also a key for the MANE-VU RPGs, is summarized in Table 3.2.

Table 3.1. Status of EGU Control Measures in MANE-VU States

Measure	***Effective Date***
Delaware	
Reg. 1144, Control of Stationary Generator Emissions, requiring emission controls for SO_2, PM, VOC, and NO_X state-wide.	Effective January 2006
Reg. 1146, Electric Generating Unit (EGU) Multi-Pollutant Regulation, requiring SO_2 and NO_X emission controls state-wide.	Effective December 2007
Reg. 1148, Control of Stationary Combustion Turbine Electric Generating Unit Emissions, requiring SO_2, NO_X, and $PM_{2.5}$ emission controls state-wide.	Effective January 2007
Maine	
Chapter 145, NO_X Control Program, limits the NO_X emission rate to 0.22 lb/MMBtu for fossil-fuel-fired units greater than 25 MW built before 1995 with a heat input capacity between 250 and 750 MMBtu/hr, and also limits the NO_X emission rate to 0.15 lb/MMBtu for fossil-fuel-fired units greater than 25 MW built before 1995 with a heat input capacity greater than 750 MMBtu/hr.	Effective 2007
Massachusetts	
Based on the Massachusetts Department of Environmental Protection's 310 CMR 7.29, *Emissions Standards for Power Plants,* adopted in 2001, six of the largest fossil-fuel-fired power plants in Massachusetts must comply with emissions limitations for NO_X, SO_2, Hg, and CO_2. These regulations will achieve an approximately 50-percent reduction in NO_X emissions and a 50- to 75-percent reduction in SO_2 emissions. Depending on the compliance paths selected, the affected facilities will meet the output-based NO_X and SO_2 standards between 2004 and 2008. This regulation also limits the six grandfathered EGUs to a CO_2 emission rate of 1,800 lb/MWh.	Effective between 2004 and 2008 depending on compliance path.
New Hampshire	

Measure	*Effective Date*
Chapter Env-A 2900, Sulfur Dioxide and Nitrogen Oxides Annual Budget Trading and Banking Program, capping NO_X emissions at 3,644 tons per year and SO_2 emissions at 7,289 tons per year for all existing fossil-fuel fired steam units.	Effective October 1, 2011
Chapter Env-A 3200, *NO_X Budget Trading Program*, limiting ozone season NO_X emissions on all fossil-fuel-fired EGUs greater than 15 MW to 0.15 lb/MMBtu.	Effective November 2, 2007
New Jersey	
The New Jersey settlement agreement with PSEG required the following actions for specific EGUs:	
Bergen Unit #2: Repower to combined cycle by December 31, 2002.	Effective December 31, 2002
Hudson Unit #2: Install dry FGD or approved alternative technology by Dec. 31, 2006, to control SO_2 emissions and operate the control technology at all times the unit operates to limit SO_2 emissions to 0.15 lb/MMBtu; install SCR or approved alternative technology by May 1, 2007, to control NO_X emissions and operate the control technology year-round to limit NO_X emissions to 0.1 lb/MMBtu; and install a baghouse or approved alternative technology by May 1, 2007, to control and limit PM emissions to 0.015 lb PM/MMBtu.	Effective May 1, 2007
Mercer Unit #1: Install dry FGD or approved alternative technology by Dec. 31, 2010, to control SO_2 emissions and operate the control technology at all times the unit operates to limit SO_2 emissions to 0.15 lb/MMBtu; and install SCR or approved alternative technology by 2005 to control NO_X emissions and operate the control technology during ozone season only in 2005 and year-round by May 1, 2006, to limit NO_X emissions to 0.13 lb/MMBtu.	Effective 2005, 2006, 2010
Mercer Unit #2: Install dry FGD or approved alternative technology by Dec. 31, 2012, to control SO_2 emissions and operate the control technology at all times the unit operates to limit SO_2 emissions to 0.15 lb/MMBtu; and install SCR or approved alternative technology by 2004 to control NO_X emissions and operate the control technology during ozone season only in 2004 and year-round by May 1, 2006, to limit NO_X emissions to 0.13 lb/MMBtu.	Effective 2004, 2006, 2010
The New Jersey settlement also requires that units operating an FGD use coal having a monthly average sulfur content no greater than 2 percent.	Effective with FGD as above
New York	
Title 6 NYCRR Parts 237, Acid Deposition Reduction NO_X Budget Trading Program, limits NO_X emissions on all fossil-fuel-fired EGUs greater than 25 MW to a non-ozone season cap of 39,908 tons in 2007.	Effective 2007
Title 6 NYCRR Parts 238, Acid Deposition Reduction SO_2 Budget Trading Program, limits SO_2 emissions from all fossil-fuel-fired EGUs greater than 25 MW to an annual cap of 197,046 tons per year starting in 2007 and an annual cap of 131,364 tons per year starting in 2008.	Effective 2007, 2008

Table 3.2. Current State Sulfur in Fuel Limits

State	*Limits Adopted as reported by MANE-VU in 2013*	
	#2 Distillate Oil	*#4 / #6 Residual Oil*
Delaware	15 ppm by 2016	0.5% by 2016
Maine	0.005% by weight by July 2016 0.0015% by weight by January 2018	0.5% by 2018
Massachusetts	500 ppm by 7/1/2014 15 ppm by 7/1/2018	1% by 7/1/2014 (0.5% for power plants) 0.5% by 7/1/2018
New Jersey	500 ppm by 2014 15 ppm by 2016	3000-5000 ppm by 2014 depending on county
New York	15 ppm by 2012 - heating oil 15 ppm by 2014 - other sources	0.3% in NYC 0.37% in Nassau, Rockland, and Westchester Counties 0.5% in the rest of the state (Purchase date 7/1/14, Use date 7/1/16
Pennsylvania	500 ppm by 2016	0.25% by weight (#4 oil) by 2016 0.5% by weight (#5, #6 oil) by 2016
Vermont	0.05% by weight by 7/1/2014 0.0015% by weight by 7/1/2018	0.25% by weight (#4 oil) by 7/1/2018 0.5% by weight (#5, #6 oil) by 7/1/2018

Source: MANE-VU Technical Support Committee summary of status of low sulfur fuel requirement

Since the original SIP in 2009 MANE-VU states have implemented additional strategies for emissions reductions in area, on-road and off-road sources. Similar to Connecticut's low sulfur fuel limits, the low sulfur fuel limits of New Jersey also apply to many of the area source units. See, e.g., N.J.A.C 7:27-16 Control and Prohibition of Air Pollution by Volatile Organic Compounds and N.J.A.C.7:27-19 Control and Prohibition of Air Pollution by Oxides of Nitrogen. Table 3.3 is the summary of the MANE-VU on-road and off-road implementation strategies since the SIP submission in 2009.

Table 3.3. Statuses of MANE-VU On-Road and Off-Road Strategies*

State	Measure	Status
Delaware	• DE Regulation 1140, Delaware's Low Emission Vehicle Program	Amended: December, 1, 2010
New Jersey	• N.J.A.C. 7:27-14.2, 14.4, and 14.6 • N.J.A.C. 7:27B-4.5 Air Test Method 4: Testing Procedures for Diesel-Powered Motor Vehicles	Adoption: April, 3, 2009
Rhode Island	• RI A.P.C.R. 37 Rhode Island's Low-Emission Vehicle Program	Amended: July, 17, 2013

* Maine, Massachusetts, New York and Vermont also participate in LEVII; implementation was completed prior to the last SIP submittal.

3.2. Status of Controls at 167 EGU Sources

In addition, MANE-VU identified 167 EGU sources whose 2002 emissions contributed to visibility impairment in MANE-VU Class I areas. The location of these sources is shown in Figure 1.3. The MANE-VU Long Term Strategy called for a 90% reduction in emissions at these sources, or, if it was infeasible to achieve that level of reduction from a unit, alternative measures as determined by the State.

NESCAUM reported on the status of emission reductions at those key sources. As shown in Table 3.4, in 2002, emissions from the 167 key stacks were nearly 4.6 million tons per year. 2011 data from EPA's Air Markets Program Data (AMPD) indicates these emissions had dropped by over 3 million tons per year. Although nine units increased emissions from 2002 to 2011, the increase of these nine units (<146,000 tons) was small compared to the overall reduction (>3,637,000 tons). Overall, from 2002-2011 heat input declined 19% and emissions decreased by 67%. Fifty-eight of the 167 key EGU stacks are located in MANE-VU. Forty-five of those, located in six states, had already achieved 90% emissions reductions by 2011. Additional reductions are expected as there are at least 16 of the units reporting emissions in 2012 but scheduled to retire before 2018.

Table 3.4. SO2 Emissions from 167 Key EGU Stacks, 2002 and 2012.[21]

State	Number of Stacks	SO_2 Emissions (Tons per Year)		Percent Change
		2002	2012[22]	
Delaware	5	22,088	2,621	-88%
Georgia	5	208,419	12,768	-94%
Illinois	1	42,331	103	-100%
Indiana	15	528,263	169,043	-68%
Kentucky	10	257,971	61,219	-76%
Maine	1	1,159	186	-84%
Maryland	9	235,435	18,376	-92%
Massachusetts	10	80,562	10,961	-86%
Michigan	5	131,709	77,209	-41%
New Hampshire	3	35,883	1,102	-97%
New Jersey	4	43,241	1,231	-97%
New York	11	138,609	5,165	-96%
North Carolina	12	323,190	39,946	-88%
Ohio	28	958,593	244,834	-74%
Pennsylvania	15	636,693	173,223	-73%
South Carolina	6	103,514	8,836	-91%
Tennessee	5	226,251	32,304	-86%
Virginia	8	141,890	19,394	-86%
West Virginia	14	465,647	65,607	-86%
Total	**167**	**4,581,447**	**944,131**	**-79%**

3.3. Federal Control Strategies

In addition to Connecticut's and MANE-VU's efforts, EPA has since promulgated federal rules that upon implementation will impact the regional haze progress. CAIR and CAIR's replacement CSAPR are the federal rules with the greatest significance to the regional haze program.

On May 12, 2005, the EPA promulgated the CAIR, which required reductions in emissions of NO_x and SO_2 from large fossil fuel fired EGUs. Expected emission reductions were included as part of the MANE-VU 2018 modeling effort. The U.S. Court of Appeals for the D.C. Circuit ruled on petitions for review of CAIR and CAIR Federal Implementation Plans, including their provisions establishing the CAIR NO_x annual and ozone season and SO_2 trading programs. On July 11, 2008, the Court issued an opinion vacating and remanding these rules. However, parties to the litigation requested rehearing of aspects of

[21] Source: Spreadsheet summarizing the SO_2 Emissions status of the "167 EGU stacks" identified in the MANE-VU Ask as of 2012. (Appendix B) This is a "point in time" snap shot, not a determination of whether a state achieved the MANE-VU "Ask."

[22] By 2012, Georgia, Illinois, Maryland, New Hampshire, New Jersey, New York and South Carolina emissions had already met the target of a 90% reduction by 2018. Other states also may have met the target by reducing emissions from other sources not included in this table.

the Court's decision. The resulting December 23, 2008 ruling left CAIR in place until EPA issued a new rule to replace CAIR in accordance with the July 11, 2008 decision.

On July 6, 2011, EPA finalized the CSAPR. EPA intended for this rule to replace CAIR beginning 2012. CSAPR was estimated to reduce EGU emissions in 28 states from 2005 levels by 6,500,000 tons of SO2 annually and 1,400,000 tons of NOX annually. These estimates represented a 71 % reduction in SO2 and a 52 percent reduction in NOX from 2005 levels.

On December 30, 2011, the U.S. Court of Appeals for the D.C. Circuit issued a ruling to stay CSAPR pending judicial review. On August 17, 2012, the D.C. Circuit Court of Appeals vacated CSAPR. On October 5, 2012, EPA requested a rehearing *en banc* of the CSAPR vacatur. The court denied this request on January 24, 2013. The Supreme Court reversed the decision of the D.C. Circuit and sent the case back to the court to resolve the outstanding substantive issues. In response on June 26, 2014, EPA filed a motion requesting that the court lift the stay on CSAPR.

On October, 23, 2014, the U.S Court of Appeals granted EPA's motion and the stay on CSAPR was lifted. CSAPR is scheduled to be effective January 1, 2015. EPA issued a ministerial rule to align the CSAPR dates as ordered by the court (November 21, 2014).

Additionally, EPA has finalized new source performance standards (NSPS) for residential wood heaters and new residential hydronic heaters and forced air furnaces. These new standards will complete the "MANE-VU" ask list. The rule is effective May 15, 2015. 23

EPA has also implemented three on-road and off-road mobile programs that have and will continue to reduce haze causing emissions. One of EPA's on-road programs that has and will result in significant emissions reductions is the "Tier 2 Vehicle and Gasoline Sulfur Program." 24,25 The EPA's Tier 2 fleet averaging program for on-road vehicles, modeled after the California LEV II standards, became effective in the 2005 model year. The Tier 2 program allows manufacturers to produce vehicles with a range of emissions levels as long as the mix of vehicles that a manufacturer sells each year has average NOX emissions below a specified value. Mobile emissions continue to benefit from this program as motorists replace older, more polluting vehicles with cleaner vehicles.

The "Heavy-Duty Diesel Engine Emission Standards for Trucks and Buses," is another on-road emissions reduction program EPA has employed that will greatly benefit regional haze improvements. EPA set a PM emissions standard of 0.01 grams per brake-horsepower-hour (g/bhp-hr) for new heavy-duty diesel engines in trucks and buses, to take full effect in the 2007 model year. This rule also includes standards for NOX and non-methane hydrocarbons (NMHC) of 0.20 g/bhp-hr and 0.14 g/bhp-hr, respectively. These NOX and NMHC standards were phased in together between 2007 and 2010. Lowering sulfur in diesel fuel enables modern pollution control technology to be effective on the trucks and buses that use this fuel. EPA required a 97 % reduction in the sulfur content of highway diesel fuel from its previous level of 500 parts per million (low-sulfur diesel) to 15 parts per million (ultra-low sulfur diesel).

[23] 80 FR 13671

[24] 40 CFR Part 80, Subpart H; 40 CFR Part 85; 40 CFR Part 86

[25] In addition EPA has finalized Tier 3, which will implement stricter vehicle emissions standards for on-road vehicles and lower the sulfur content of gasoline.

EPA's "Emission Standards for Large Industrial Spark-Ignition Engines and Recreational Vehicles" is designed to reduce emissions from off-road vehicles. EPA has adopted new standards for emissions of NO_X, hydrocarbons (HC), and carbon monoxide (CO) from several groups of previously unregulated non-road engines. Included are large industrial spark-ignition engines and recreational vehicles. The affected spark-ignition engines are those powered by gasoline, liquid propane, or compressed natural gas rated over 19 kilowatts (kW) (25 horsepower). These engines are used in commercial and industrial applications, including forklifts, electric generators, airport baggage transport vehicles, and a variety of farm and construction applications. Non-road recreational vehicles include snowmobiles, off-highway motorcycles, and all-terrain vehicles. These rules were initially effective in 2004 and were fully phased-in by 2012.

3.4. Assessment of Implementation of Strategies Outside of Connecticut

40 CFR section 51.308(g)(6) of the RHR requires an assessment of whether the current implementation plan elements and strategies are sufficient to enable the State, or other States with mandatory Federal Class I areas affected by emissions from the State, to meet all established RPGs.

Based on the information summarized in this report, DEEP determines that the existing Regional Haze SIP is sufficient to meet our RPGs. Connecticut is on track for meeting the long term goals laid out in the Regional Haze SIP, as all of the strategies committed to have been implemented and emissions reductions have exceeded expectations (see Section 4). All of the Class I areas in the region have already met the said 2018 goals (see Section 5).

Section 4: Emissions Inventory Trends

The control strategies of the regional haze SIP, described in Sections 2 and 3, are intended to reduce the emissions of haze causing pollutants. To assure success and adequacy of the SIP an analysis of emissions trends is provided in this section.

4.1. Requirements Addressed

This section addresses the requirements of 40 CFR sections 51.308(g)(2), 51.308(g)(4), and 51.308(g)(5) .

40 CFR section 51.308(g)(2) requires that the progress report summarize the emissions reductions achieved throughout the State through implementation of the measures included in the State's SIP for achieving reasonable progress at Class I areas (as described in the previous sections). This is addressed specifically in section 4.2 of this report.

40 CFR section 51.308(g)(4) requires each state to analyze and track changes over the most recent five years in emissions of pollutants contributing to visibility impairment from all sources and activities within the State. Emissions changes are to be identified by type of source or activity. The analysis must be based on the most recent updated emissions inventory, with estimates projected forward as necessary and appropriate, to account for emissions changes during the applicable 5-year period.

40 CFR section 51.308(g)(5) requires an assessment of any significant changes in anthropogenic emissions within or outside the State that have occurred over the past five years that have limited or impeded progress in reducing pollutant emissions and improving visibility.

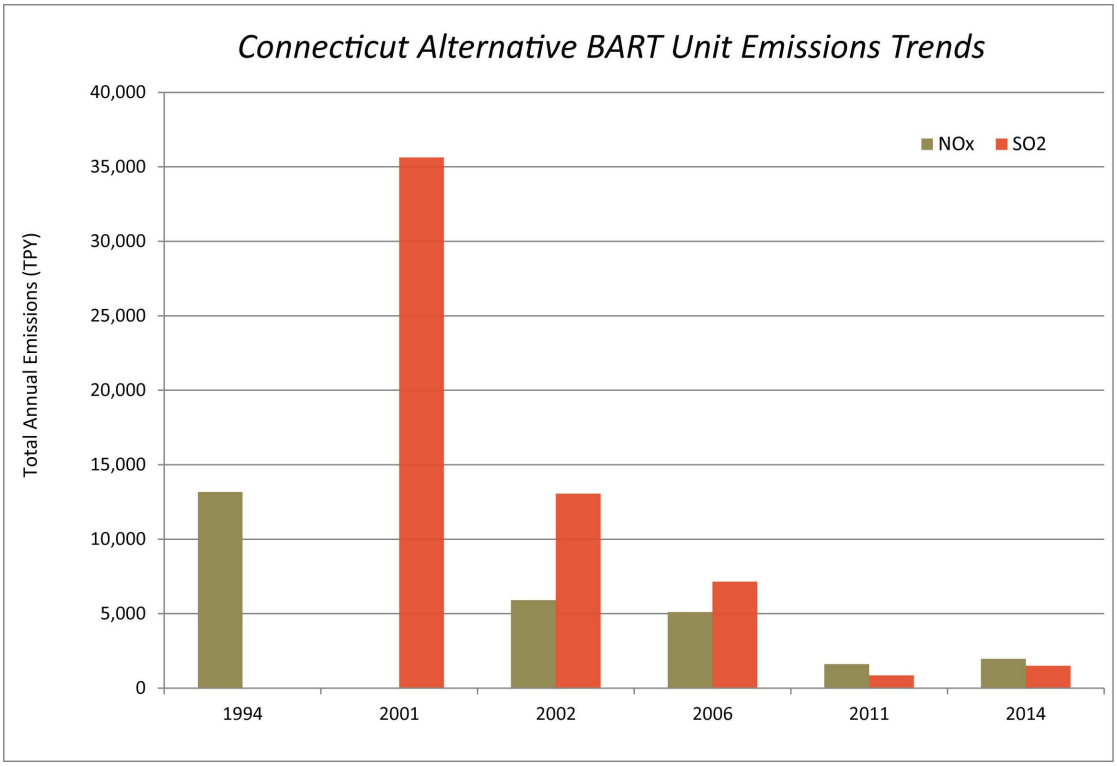
The following emissions inventories are a compilation of three sources. First, the National Emissions Inventory (NEI)[26] provides a comprehensive estimate of air emissions for criteria and hazardous air pollutants at the facility level. Second, Connecticut's Periodic Emissions Inventory (PEI) is similar to NEI but includes emissions of more sources and at a unit level. Both the NEI and the PEI provide data for all the years needed under the requirements of the look back guidance (two years at five years apart). Third, MANE-VU collected a regional inventory for the years 2002, 2007 and projected 2018.

4.2. Connecticut Emissions Inventory Trends

The MANE-VU Ask was designed to achieve reductions in SO_2 emissions, as SO_2 is the driving primary pollutant for the production of sulfate, and sulfate is the most significant pollutant impacting regional haze in MANE-VU Class I areas. This approach was successful as evidenced by the visibility improvements reviewed in Section 5 and in the emissions trends described below. Connecticut alternative-BART units achieved 97% reductions in SO_2 emissions from 2001 and just under an 88% reduction in NO_x emissions since 1994, see Figure 4.1 and Appendix C.

[26] Note, NEI for 2011 is version 1. There are known issues with some of the data quality for area sources. See Appendix F for DEEP's comments for 2011 inventory revisions which were included in the letter "Comments of the Connecticut Department of Energy and Environmental Protection on the 2018 Emissions Modeling Platform"

Figure 4.1. BART Alternative Program Emissions Trends



Emissions from the alternative BART sources are expected to continue declining through 2018 as a result of the continued implementation of the control strategies referenced in Section 3 of this report, known retirements that have occurred since the 2011 inventory and the projected fuels trends that anticipate growth in natural gas and renewable energy sources (see Figure 4.2).

In addition to the limitations applied on the industrial boilers and EGUs, CGS section 16a-21a reduced the fuel sulfur content limits for home heating oil and non-road diesel in accordance with the MANE-VU agreement. The emissions reductions from Connecticut's fuel sulfur limitations are yet to be realized since the limitations were effective in July 2014. MANE-VU modeling for area sources (which captures the home heating oil strategies of the MANE-VU states), and non-road sources show significant SO_2 reductions through 2018 and beyond (see Table 4.2 and Figure 4.5). However, as summarized in Table 4.1 Connecticut's non-road sector has already achieved 98% SO_2 reduction since 2002, and the area sector has realized a 25% reduction. Area sources displayed a NO_x emissions increase of just over 4,000 tons from 2002 to 2011. However, this increase does not prevent the net decrease of more than 40,000 tons in Connecticut's total NO_x emissions.

Figure 4.2. U.S. Electric Generating Capacity, AEO (Annual Energy Outlook) 2014 Projections

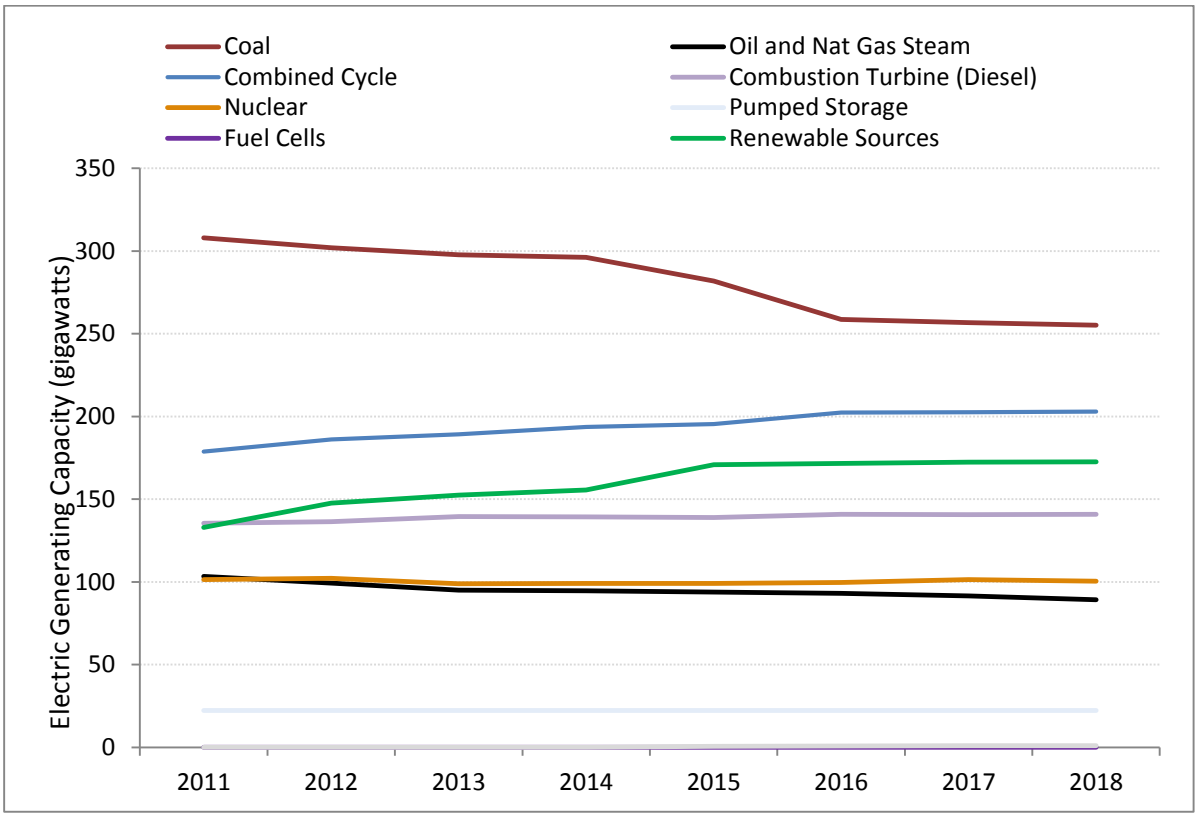


Table 4.1. Connecticut Sector Emissions (NEI)

	NOx Emissions (TPY)				SO2 Emissions (TPY)			
Connecticut	2002	2008	2011	2018*	2002	2008	2011	2018*
Point	12,867.7	8,580.5	6,403.9	10,919	16,027.4	5,551.9	1,270.1	8,765
Non-road	22,978.6	15,834.8	13,046.5	16,233	2,385.5	245.7	37.8	815
On-road	66,812.6	51,619.0	36,659.2	14,787	1,667.1	334.4	281.5	366
Area	12,554.1	17,045.2	16,718.6	11,795	18,454.3	13,310.9	13,744.4	534

	VOC Emissions (TPY)				PM2.5 Emissions (TPY)			
Connecticut	2002	2008	2011	2018*	2002	2008	2011	2018*
Point	4,906.7	1,246.7	1,042.0	4,372	1,201.3	533.0	441.8	1,864
Non-road	33,208.6	24,281.5	16,826.7	20,694	1,875.0	1,349.4	1,221.5	1,135
On-road	47,757.4	26,450.8	21,669.0	10,768	1,066.5	1,824.5	1,142.9	500
Area	105,949.7	34,044.8	40,271.5	68,395	13,220.7	12,483.5	13,739.3	9,635

* Emissions estimates are the 2018 RPGs of the original SIP submission.

Table 4.2. MANE-VU Actual and Projected Emissions

		(1)	(2)	(3)	(4)	(5)
		2002	2007	2017	2018	2020
Pollutant	**Data Source(1)**	**2002 V3**	**2007 V3**	**2007 V3**	**2002 V3**	**2007 V3**
NOx	Area(4)	266,747	207,054	194,832	263,954	194,868
	Nonroad MAR(4)	137,733	173,855	127,391	111,425	118,025
	Nonroad NMIM(4)	289,392	263,931	153,553	158,843	135,962
	Onroad Mobile(4)	1,308,235	1,175,916	---	303,956	471,558
	Point EGU(2)	453,395	338,488	---	168,268	---
	Point non-EGU(3)	213,414	174,043	169,188	174,218	169,668
	Total	**2,668,916**	**2,333,286**	**---**	**1,180,664**	**---**
Direct PM2.5	Area(4)	332,676	259,938	262,887	339,518	264,959
	Nonroad MAR(4)	7,929	7,430	3,906	7,927	3,503
	Nonroad NMIM(4)	27,922	24,701	16,536	15,952	14,421
	Onroad Mobile(4)	22,108	45,616	---	9,189	28,365
	Point EGU(2)	20,670	44,921	**---**	51,109	**---**
	Point non-EGU(3)	33,948	29,881	29,659	38,393	29,868
	Total	**445,253**	**412,486**	**---**	**462,087**	**---**
SO2	Area(4)	316,287	212,471	119,215	190,437	116,511
	Nonroad MAR(4)	32,123	30,318	4,870	8,172	4,183
	Nonroad NMIM(4)	24,774	14,167	420	466	443
	Onroad Mobile(4)	40,092	8,974	---	8,756	7,202
	Point EGU(2)	1,670,176	1,546,335	---	365,024	---
	Point non-EGU(3)	239,400	129,615	112,784	201,478	112,828
	Total	**2,322,851**	**1,941,879**	**---**	**774,333**	**---**
Volatile Organic Compounds (VOCs)	Area(4)	1,366,735	784,233	702,289	1,334,175	696,125
	Nonroad MAR(4)	14,026	19,066	17,057	14,962	16,962
	Nonroad NMIM(4)	557,536	412,890	244,126	364,980	222,226
	Onroad Mobile(4)	789,560	600,638	---	269,979	269,647
	Point EGU(2)	11,943	4,975	**---**	4,344	**---**
	Point non-EGU(3)	92,562	68,003	68,099	103,727	68,005
	Total	**2,832,364**	**1,889,805**	**---**	**2,092,168**	**---**

Reference: "Regional Emissions Trends Analysis for MANE-VU States: Technical Support Document, Revision 3,"

1) This trend is built from three sources:
   2002 V3 with future projection to 2018 (Columns 1 and 4)
   2007 V3 with a projection to 2017 and 2020 (Columns 2, 3 and 5)

(2) Data meets or exceeds target of 90% complete across all years for most states. Units with incomplete data for one or more years have been completed by states or have been removed so that a consistent set of data is presented across years. Therefore totals are not identical to modeled inventory or TSD.

(3) Data identical to modeled inventory and TSD for most states. No revision to correct inconsistent methodology.
   Nonroad MAR – includes commercial marine vessels, airports, and railroad locomotives
   Nonroad NMIM – includes equipment included in USEPA's NMIM/NONROAD model

(4) Data identical to modeled inventory and TSD for most states. No revision to correct inconsistent methodology.
   Nonroad MAR – includes commercial marine vessels, airports, and railroad locomotives
   Nonroad NMIM – includes equipment included in USEPA's NMIM/NONROAD model

4.3. Emissions Inventory Outside of Connecticut Borders

As discussed in the above sections the strategy was targeted at reducing SO_2 as it was the primary pollutant causing visibility impairment at the Class I areas. MANE-VU as a whole was successful in implementing the strategies set in the collaboration process. This success is evident in the reduction of SO_2 emissions from point sources for each of the MANE-VU states. Below, Figure 4.3 displays the point source emissions from 1990 – 2011 with reference lines for 50% and 90% reductions from 1990 values. Note most states individually meet the 90% reduction, with the exception of NH, PA, RI and VT. However, collectively as of 2011 the RPO achieved an 81% reduction from 1990 values.

Figure 4.3. SO_2 Point Source Emissions for MANE-VU States, NEI

	MANE-VU SO2 Point Source Emissions (tpy)					
	1990	1996	2002	2008	2011	Sparkline
CT	70,845	44,055	16,027	5,552	1,270	100,000 / 0
DC	5,123	1,717	2,057	343	788	6,000 / 0
DE	88,450	83,836	74,447	41,108	11,488	100,000 / 0
MA	256,593	121,119	105,966	52,937	26,456	300,000 / 0
MD	314,157	275,360	291,009	255,181	57,512	350,000 / 0
ME	70,086	28,128	22,915	13,590	6,434	70,000 / 0
NH	76,597	58,605	46,579	38,940	25,744	80,000 / 0
NJ	155,021	133,862	61,229	28,034	6,737	175,000 / 0
NY	654,256	404,465	297,113	114,601	66,684	675,000 / 0
PA	1,337,470	1,156,280	995,869	910,372	367,948	1,500,000 / 0
RI	3,899	2,664	2,653	1,022	1,008	4,000 / 0
VT	1,050	2,117	911	167	431	3,000 / 0
MANE-VU Total	3,033,547	2,312,208	1,916,775	1,461,845	572,500	3,050,000 / 0

The MANE-VU region also made significant reductions in the NO_x emissions from point sources, specifically the region saw a reduction of 44% (see Figure 4.4). A summary of sector emissions reductions for $PM_{2.5}$, VOC, NO_x and SO_2 of the MANE-VU states is displayed in Table 4.3 (For the entirety of the NEI reported emissions see appendix D). These reductions achieved even for most of the non-targeted pollutants in the region are only further evidence that the region is collectively making great

strides in reducing the emissions impacts on regional haze and ensuring that future emissions will not impede progress. As Table 4.3 also displays the MANE-VU region experienced increases in area source NO_x and VOC emissions and an increase in on-road $PM_{2.5}$ emissions. Despite this, the evidence in the next section shows that the overall reductions overwhelm these few increases and that such minor increases do not inhibit the region's ability to improve visibility and continue to make progress toward the 2018 goals.

Figure 4.4. NOx Point Source Emissions for MANE-VU States, NEI

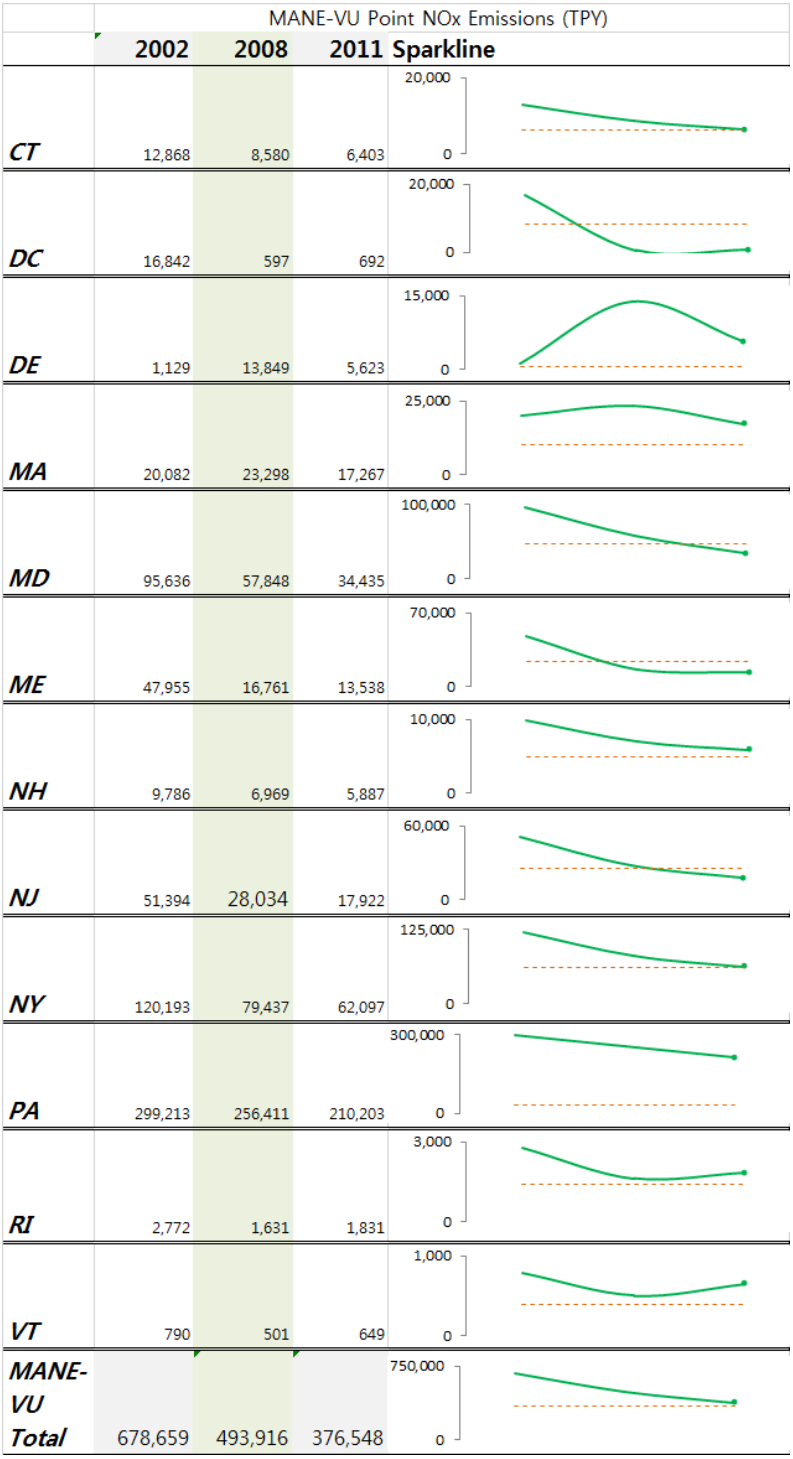


Table 4.3. MANE-VU States 2011 Emissions Reductions (NEI 2002 & 2011)[27]

		2011 % Reduction from 2002												
SECTOR	POLLUTANT	CT	DC	DE	MA	MD	ME	NH	NJ	NY	PA	RI	VT	MANE-VU
POINT	Nitrogen Oxides	50.23%	38.65%	66.61%	63.99%	63.99%	32.59%	39.84%	65.13%	48.34%	29.75%	33.96%	17.80%	44.52%
	PM2.5 Primary (Filt + Cond)	63.23%	46.99%	49.34%	63.78%	76.08%	38.35%	72.68%	50.12%	65.11%	58.59%	2.30%	34.94%	61.31%
	Sulfur Dioxide	92.08%	61.71%	84.57%	75.03%	80.24%	71.92%	44.73%	89.00%	77.56%	63.05%	62.20%	52.70%	70.13%
	Volatile Organic Compounds	78.76%	6.46%	63.16%	52.88%	53.08%	31.93%	59.23%	45.56%	-52.79%	36.37%	39.42%	57.40%	37.63%
NON-ROAD	Nitrogen Oxides	43.22%	34.88%	73.35%	70.39%	62.36%	50.29%	33.14%	66.59%	50.03%	62.65%	57.51%	23.12%	59.60%
	PM2.5 Primary (Filt + Cond)	34.86%	32.16%	61.36%	63.26%	51.12%	39.08%	25.79%	55.14%	38.48%	41.21%	49.62%	18.75%	46.41%
	Sulfur Dioxide	98.41%	98.40%	99.89%	99.71%	99.63%	99.31%	97.45%	99.59%	99.10%	98.83%	99.56%	97.24%	99.42%
	Volatile Organic Compounds	49.33%	35.57%	38.89%	38.32%	48.51%	14.23%	31.21%	52.44%	29.95%	28.05%	40.82%	13.46%	35.95%
ON-ROAD	Nitrogen Oxides	45.13%	45.97%	38.00%	52.62%	32.95%	40.27%	52.61%	50.15%	44.75%	30.68%	38.98%	50.39%	41.73%
	PM2.5 Primary (Filt + Cond)	-7.16%	-37.77%	-0.35%	-15.31%	-28.11%	-18.24%	-9.87%	-26.92%	-35.75%	-24.31%	-77.15%	12.86%	-24.78%
	Sulfur Dioxide	83.11%	83.47%	84.70%	83.46%	86.25%	88.50%	85.96%	79.78%	82.64%	88.10%	81.80%	89.47%	84.65%
	Volatile Organic Compounds	54.63%	60.43%	39.23%	52.11%	48.71%	46.74%	-365.41%	59.15%	56.85%	45.13%	52.52%	70.76%	41.13%
AREA	Nitrogen Oxides	-37.25%	6.80%	-112.79%	-7.38%	-21.80%	-90.32%	42.49%	-53.81%	-24.31%	-110.42%	-139.33%	-84.47%	-44.25%
	PM2.5 Primary (Filt + Cond)	-3.92%	-9.33%	-28.87%	24.75%	32.70%	20.08%	16.38%	-12.62%	17.35%	-10.79%	-96.91%	-20.94%	9.11%
	Sulfur Dioxide	38.24%	61.29%	93.24%	46.91%	93.09%	58.57%	60.60%	64.51%	87.44%	82.16%	16.97%	81.60%	78.03%
	Volatile Organic Compounds	42.32%	74.91%	-46.90%	46.50%	13.02%	-256.18%	-52.94%	29.77%	37.20%	-57.77%	6.36%	-283.66%	-3.50%

[27] Highlighted rows indicate the pollutant targeted for strategies to meet reasonable progress goals. Positive values indicate decreases in emissions.

4.4. Assessment

40 CFR section 51.308(g)(2) requires that the progress report summarize the emissions reductions achieved throughout the State through implementation of the measures included in the State's SIP for achieving reasonable progress at Class I areas (as described in the previous sections). Section 4.2 outlines the success of the programs in terms of emissions reductions for the alternative BART program and the anticipated success of the low sulfur fuel statute. The reductions already achieved through the alternative BART program and the timely implementation of the low sulfur fuel regulations and statutes have met and will continue to meet the goals set in the original SIP submission.

40 CFR section 51.308(g)(4) requires each state to analyze and track changes over the past five years in emissions of pollutants contributing to visibility impairment from all sources and activities within the state. Emissions changes outlined in sections 4.2 and 4.3 are evidence of a successful program within Connecticut and the region. SO_2, decreased by 81% from 2002 values in 2011, thereby enabling the region to meet the 2018 goals. NO_X emissions also decreased significantly, within the state and region. While VOCs, and $PM_{2.5}$ were not deemed of importance to improving visibility in Class I areas and thereby were not the target of regional haze strategies, Connecticut's emissions trends specific to these pollutants also show decreases in most sectors.

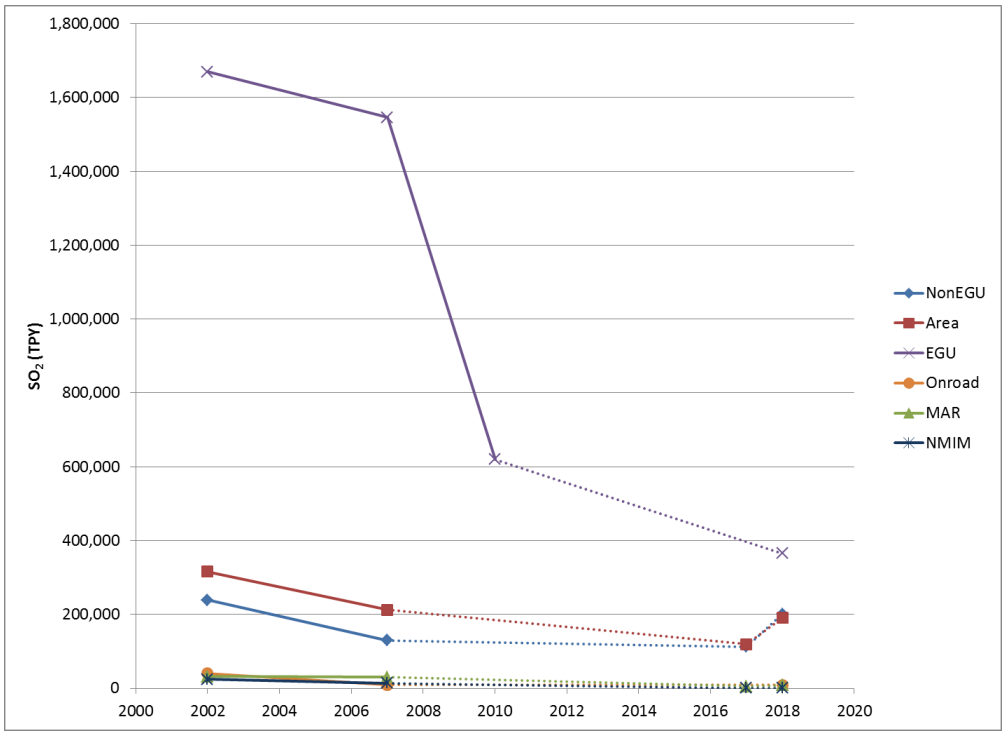
40 CFR section 51.308(g)(5) of the RHR requires an assessment of any significant changes in anthropogenic emissions within or outside the State that have occurred over the past five years that have limited or impeded progress in reducing pollutant emissions and improving visibility.

EPA has indicated a significant change that can limit or impede progress could be either:

- a significant unexpected increase in anthropogenic emissions that occurred over the five-year period (that is, an increase that was not projected in the analysis of the SIP), or
- a significant expected reduction in anthropogenic emissions that did not occur (that is, a projected decrease in emissions in the analyses for the SIP that was not realized).

In general, haze-causing emissions in MANE-VU region have declined and are projected to continue to decline. (See Figure 4.3, 4.4 and Figure 4.5). In addition, the general decline for all pollutants in the region, with the exception of a few small increases in non-targeted areas, results in the conclusion that changes in anthropogenic emissions have not and will not impede progress for improving visibility.

Figure 4.5. Regional SO2 Emission Trends by Sector, MARAMA Projections[28]



[28] For the full details of the modeling used for the projections noted above see: *Technical Support Document for the Development of the 2013/2017/2020 Emission Inventories for Regional Air Quality Modeling in the Northeast / Mid-Atlantic Region Version 3_3*. January 23, 2012

Section 5: Changes in Visibility for each Mandatory Federal Class I Area in and near MANE-VU

Ultimately, the purpose of the regional haze program and the associated SIPs is to improve visibility in Class I areas. This section reviews the most recent visibility data and compares it to the RPGs set for each Class I area in the region to determine if the current SIP is adequate to meet the RPGs in 2018. The analysis provided in this section reveal that each of the Class I areas have already attained their RPGs.

5.1. Reasonable Progress Goals

The goal of the RHR is to restore natural visibility conditions to each of the 156 Class I areas identified in the 1977 Clean Air Act Amendments. Section 51.301(q) defines natural conditions "as naturally occurring phenomena that reduce visibility as measured in terms of light extinction, visual range, contrast, or coloration." Regional Haze SIPs must contain measures that make "reasonable progress" toward this goal by reducing anthropogenic emissions that cause haze.

Each MANE-VU State with one or more Class I areas adopted a Regional Haze SIP identifying baseline visibility for the five-year period from 2000 through 2004 and establishing goals that provide for reasonable progress in improving visibility at Class I areas in the state by 2018. Baseline visibility and RPGs were established for the 20% of days with the worst visibility and the 20% clearest days.

MANE-VU states with Class I areas adopted the following goals for visibility improvement at Class I areas by 2018. These goals were approved by the US EPA as reasonable progress toward achieving natural visibility conditions by the year 2064.

Table 5.1. RPGs in Approved Regional Haze Plans

	Class I Area	Baseline Visibility (2000 – 2004)	Reasonable Progress Goal Visibility (2018)	Natural Visibility Conditions
20% Haziest Days	Acadia National Park (ME)	22.9	19.4	12.4
	Brigantine Wilderness (NJ)	29.0	25.1	12.2
	Great Gulf Wilderness & Presidential Range-Dry River Wilderness (NH)	22.8	19.1	12.0
	Lye Brook Wilderness (VT)	24.4	20.9	11.7
	Moosehorn Wilderness and Roosevelt Campobello International Park (ME)	21.7	19.0	12.0
	Dolly Sods Wilderness (WV)	29.5	21.7	10.4
	Shenandoah National Park (VA)	29.3	21.9	11.4
20% Clearest Days	Acadia National Park (ME)	8.8	8.3	4.7
	Brigantine Wilderness (NJ)	14.3	14.3	5.5
	Great Gulf Wilderness & Presidential Range-Dry River Wilderness (NH)	7.7	7.2	3.7
	Lye Brook Wilderness (VT)	6.4	5.5	2.8
	Moosehorn Wilderness and Roosevelt Campobello International Park (ME)	9.2	8.6	5.0
	Dolly Sods Wilderness (WV)	12.3	11.1	3.6
	Shenandoah National Park (VA)	10.9	8.7	3.1

Source: *Tracking Visibility Progress: 2004-2011,* NESCAUM, April 30, 2013 (Revised May 24, 2013)

Units: Visibility in deciviews.

5.2. Requirements to Track Changes in Visibility

40 CFR section 51.308(g)(3), the Regional Haze Rule requires states with Class I areas to assess the current visibility conditions for the five years of most recent visibility data, compare that to baseline visibility conditions for the 2000-2004 period, and assess the change in visibility impairment over the past five years. To mitigate the impacts of year-to-year variability in determining progress towards the RPGs, the RHR mandates the use of five-year-averaged values of both the annual mean 20% best and 20% worst days determined for each site.

Connecticut has no Class I areas within its borders, but provides the following information to show that progress is being made in improving visibility at Class I areas in and near MANE-VU in support of the State's determination of the adequacy of its regional haze SIP.

For each Class I area, there are three metrics of visibility that are part of the determination of reasonable progress:

(1) Baseline conditions,

(2) Natural conditions (in 2064), and

(3) Current conditions.

Progress in improving visibility at Class I areas within MANE-VU is measured via the IMPROVE monitoring network. A coalition composed of the National Park Service (NPS), the Fish and Wildlife Service (FWS), the Bureau of Land Management (BLM), the Forest Service (FS) and the USEPA established the Interagency Monitoring of Protected Visual Environments (IMPROVE) program in response to the 1977 amendments to the Clean Air Act. This monitoring network has collected speciated fine aerosol and related visibility data in or near Federal Class 1 areas in the United States since 1988.

5.3. Review of Recent Improve Data

Connecticut has no Class I areas within its borders, therefore the analysis and interpretation of the Class I areas below is supplied by MANE-VU.

In 2013 NESCAUM prepared the report *Tracking Visibility Progress: 2004-2011*. The report analyzes visibility data from the 2000-2004 baseline through the most recent 5-year period with available data – 2007-2011. The results of this analysis showed the following:

- There are definite downward trends in overall haze levels at the Class I areas in and adjacent to the MANE-VU region.
- Based on rolling-five year averages demonstrating progress since the 2000-2004 baseline period, the MANE-VU Class I areas appear to be on track to meet their 2018 RPGs (RPGs) for both best and worst visibility days.
- The trends are mainly driven by large reductions in sulfate light extinction, and to a lesser extent, nitrate light extinction.

- Levels of organic carbon mass (OCM) and light absorbing carbon (LAC) appear to be approaching natural background levels at most of the MANE-VU Class I areas.
- In some cases, the levels set by 2018 RPGs have already been met, and progress beyond those goals appears achievable.
- Though the Brigantine Wilderness Area is on track to meet its 2018 RPGs, challenges remain. Sulfate light extinction levels are higher at this site than at others across the region. Additional sulfate reductions would be a significant driver in reducing overall haze levels at Brigantine.

Table 5.2 and Figure 5.1a-g below provide the most recent quality assured data (through 2013) for the Class I area(s) in and near MANE-VU in comparison to the baseline visibility measured for 2000-2004. Visibility at all MANE-VU Class I areas has improved, and all areas are expected to meet 2018 RPGs. Table 5.2 also shows progress at nearby Class I areas. As required, visibility is reported as a five-year average in deciviews. (See Appendix E for a discussion of how deciviews are calculated.)

In Figure 5.1a-g, the "Uniform Rate of Progress" line indicates the rate of progress needed to achieve natural visibility by 2064 (the target set by the Clean Air Act). If the reasonable progress goal (RPG) for a Class I area for 2018 is below the Uniform Rate of Progress line, it indicates a faster rate of progress by 2018 than necessary to achieve the uniform rate of progress. None of the MANE-VU states established RPGs for 2018 that provided for a slower rate of improvement than the uniform rate.

Table 5.2. Visibility Improvements through 2011 at Class I Areas in and Near MANE-VU

	Class I Area	Baseline Visibility (2000 – 2004)	Current Visibility (2009-2013)	Change (Baseline – Current Visibility)
20% Haziest Days	Acadia National Park	22.89	17.93	4.96
	Brigantine Wilderness	29.01	23.75	5.26
	Great Gulf Wilderness & Presidential Range-Dry River Wilderness	22.82	16.66	6.16
	Lye Brook Wilderness	24.45	18.78	5.67
	Moosehorn Wilderness and Roosevelt Campobello International Park	21.72	16.83	4.89
	Dolly Sods Wilderness	29.05	22.40	6.65
	Shenandoah National Park	29.31	21.82	7.49
20% Clearest Days	Acadia National Park	8.78	7.02	1.76
	Brigantine Wilderness	14.33	12.25	2.08
	Great Gulf Wilderness & Presidential Range-Dry River Wilderness	7.66	5.86	1.80
	Lye Brook Wilderness*	6.37	4.90	1.47
	Moosehorn Wilderness and Roosevelt Campobello International Park	9.16	6.70	2.46
	Dolly Sods Wilderness	12.28	9.03	3.25
	Shenandoah National Park	10.93	8.60	2.33

Units: Visibility in deciviews

*2000-2011 data from LYBR1 site and 2012-2013 data from LYEB1

Figure 5.1. Charts of MANE-VU Class 1 Area Visibility 2000 – 2013, compared to RPGs for 2018

Figure 5.1.a. Acadia National Park

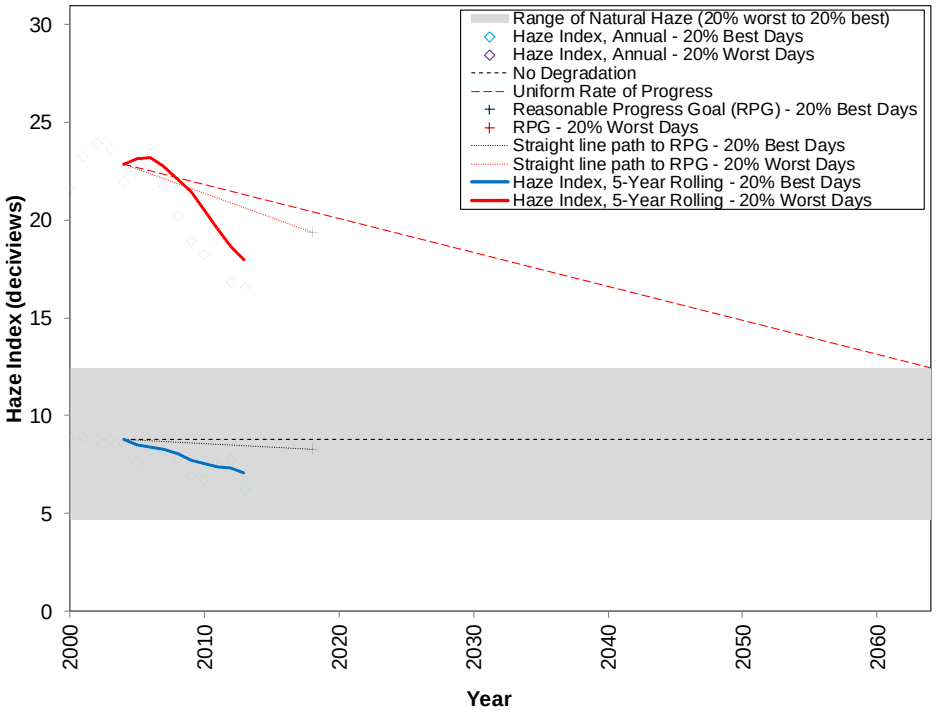


Figure 5.1.b. Brigantine Wilderness

Figure 5.1.c. Great Gulf Wilderness

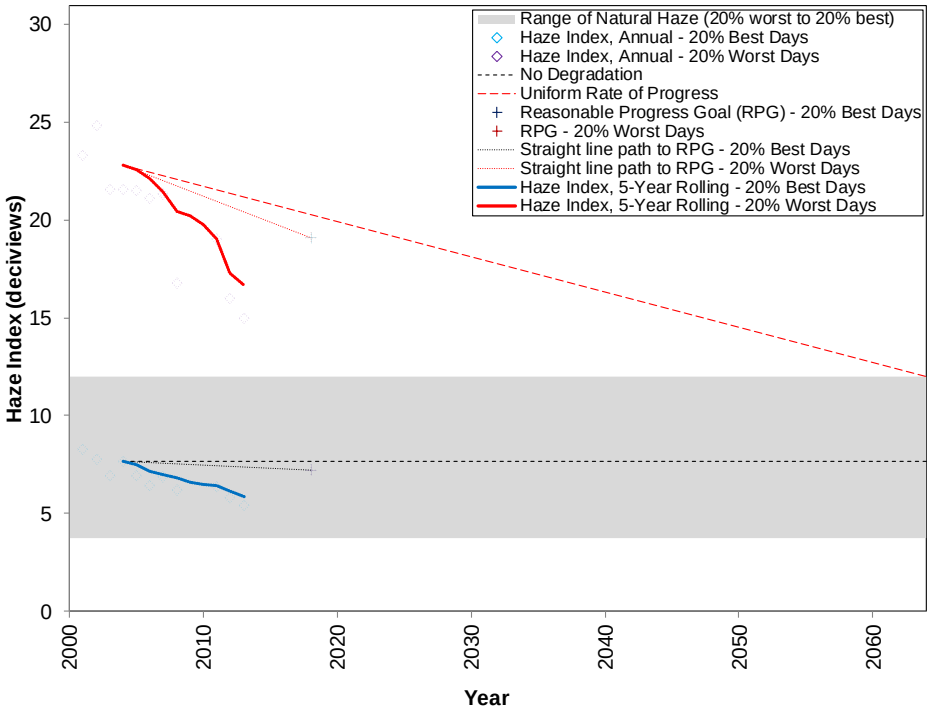


Figure 5.1.d. Lye Brook Wilderness

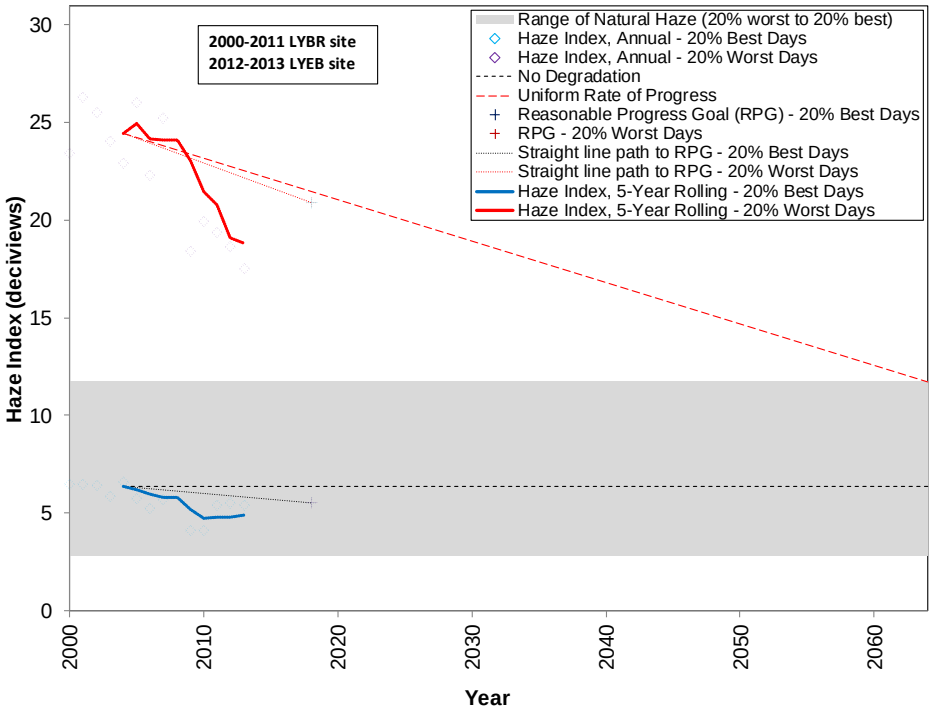


Figure 5.1.e. Moosehorn Wilderness

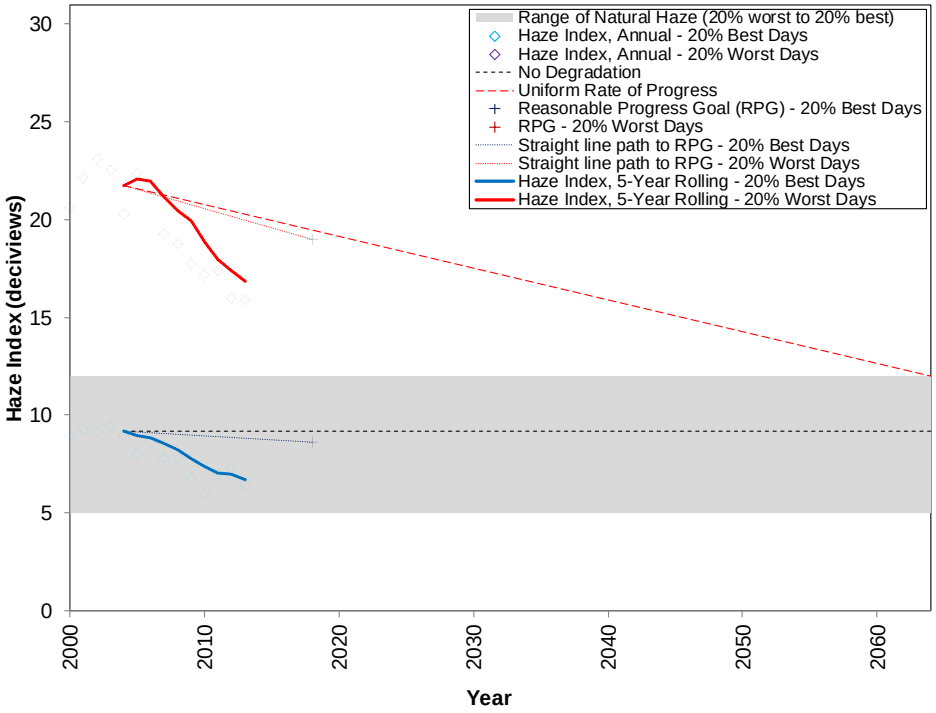


Figure 5.1.f. Dolly Sodds Wilderness

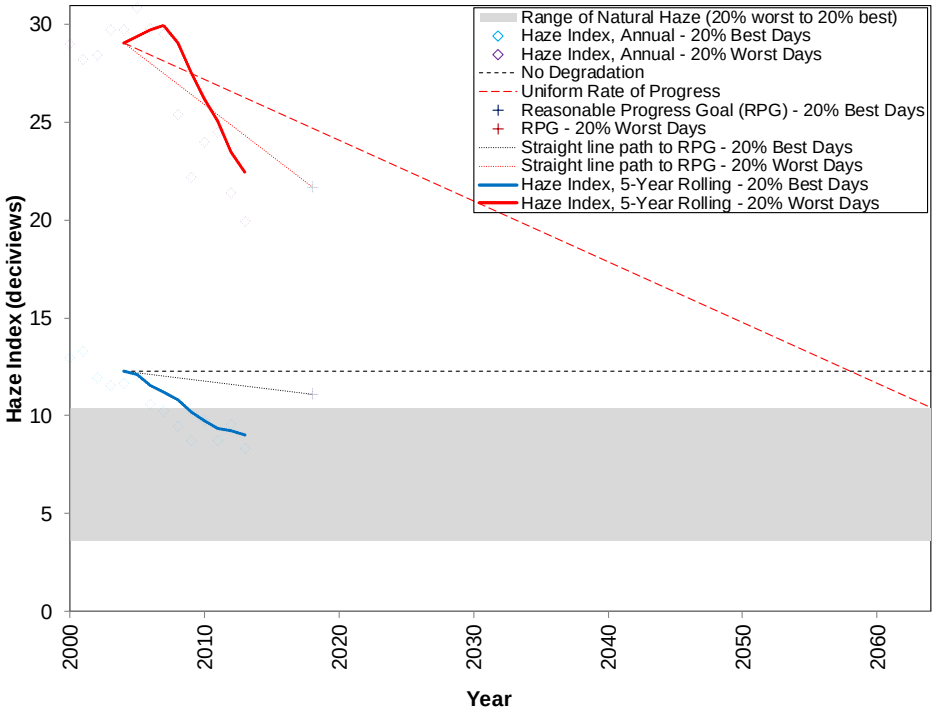
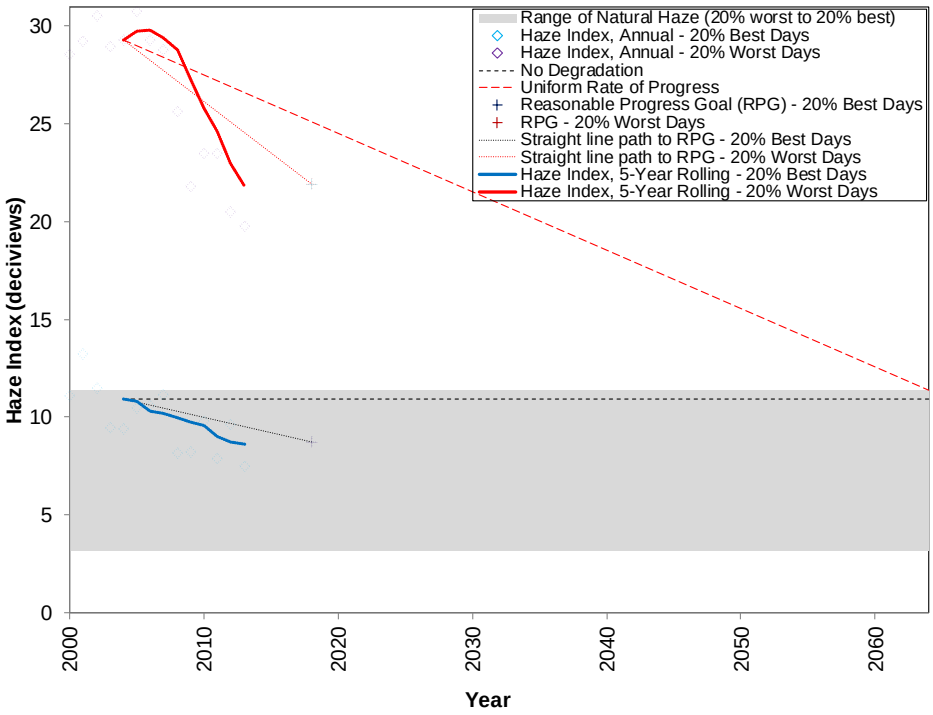


Figure 5.1.g. Shenandoah Valley National Park



In addition to the success demonstrated in the figures above of the Class I area IMPROVE sites, Connecticut has seen significant improvements at the IMPROVE site in Cornwall, CT. The pie charts below in Figure 5.2 display the change in the total $PM_{2.5}$ concentration (pies are proportionally sized to the concentrations in respective years) and the speciation of the annual averages. The total $PM_{2.5}$ concentration at the Cornwall IMPROVE site has seen a decrease of 49.7%. This corresponds to a 27.3% improvement in the annual average haze index at the site during the same period. Note Figure 5.3 shows the haze index reduction from 2001-2013 at the Cornwall Mohawk Mountain IMPROVE site. While not a Class I area, due to the proximity of the site, the influence of Connecticut's sources is much greater at this site than at the local Class I areas and yet the Cornwall Mohawk Mountain site haze trend has been negative. Therefore, the ambient PM2.5 concentration reductions evident in this analysis are further confirmation of the adequacy of the current SIP.

Figure 5.2. Cornwall IMPROVE Site Mass Reconstruction of 2004 and 2013 Annual Average

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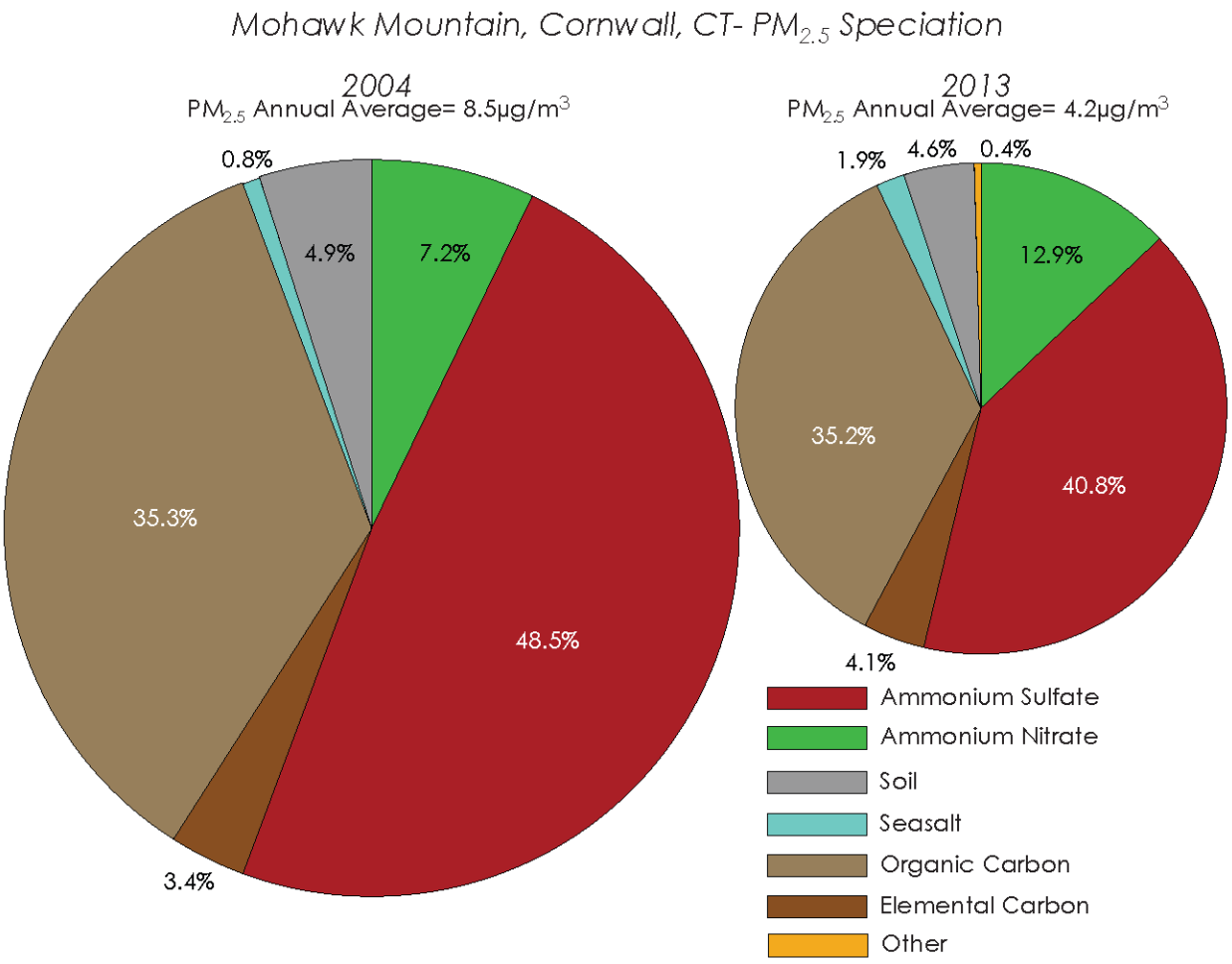
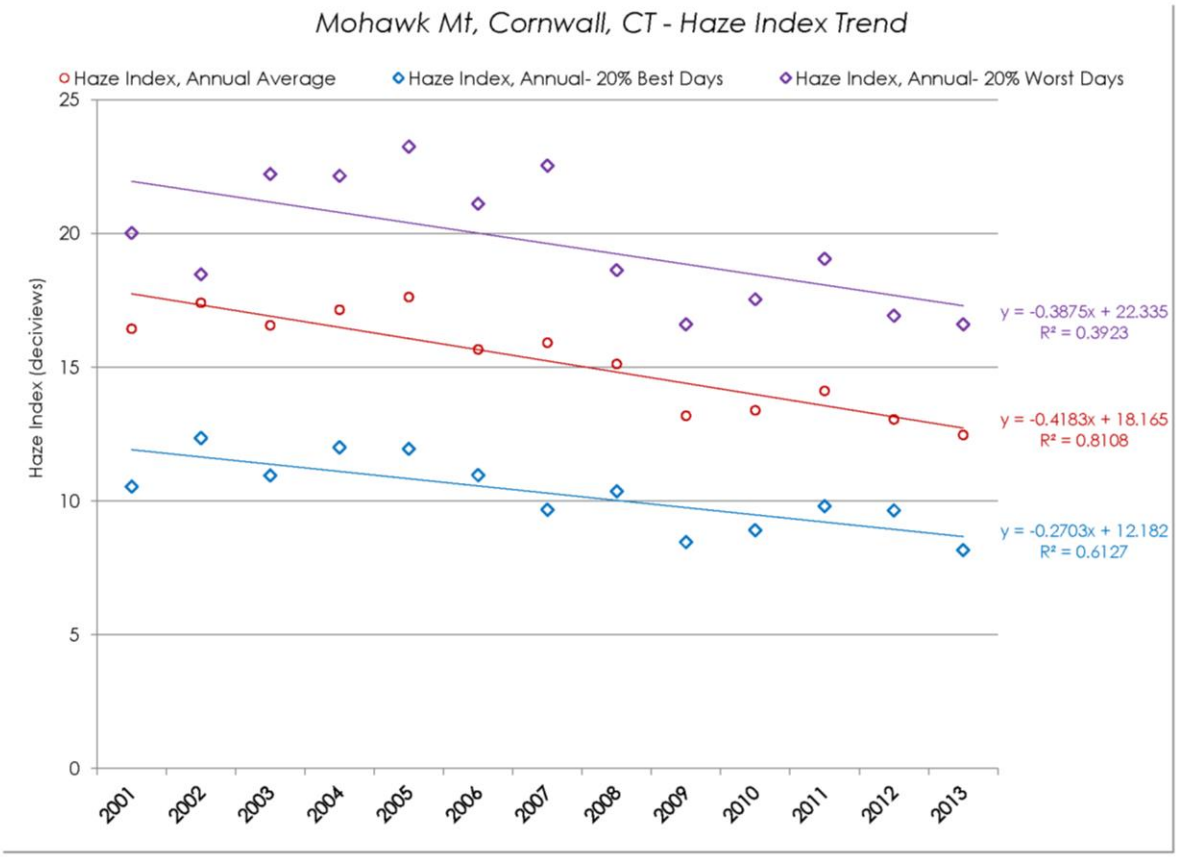


Figure 5.3. Cornwall- Mohawk Mountain Haze Index Trend



5.4. Tracking Visibility Progress – National Evaluation

In addition to NESCAUM's analysis, a national report also documented progress in visibility improvement through 2009. The 2011 IMPROVE Report V: *Spatial and Seasonal Patterns and Temporal Variability of Haze and its Constituents in the United States*, reported on five-year average reconstructed light extinction (the regional haze tracking metric) at IMPROVE sites for the baseline 2000-2004 period as well as for the next five-year period, 2005-2009.[29] These five-year averages include total light extinction as well as the extinction contributed by separate pollutant species for the haziest 20% of days and for the clearest 20% of days for each of these 5-year periods.

Visibility at all MANE-VU Class I Area IMPROVE sites improved for the 2005-2009 period compared to the 2000-2004 baseline period. These improvements occurred for both the haziest 20% days (which are required to get gradually cleaner over time) as well as for the cleanest 20% days (which are required to get no worse over time).[30] Improvements in total light extinction on both the haziest and the cleanest days resulted from reductions in light extinction from all four of the major visibility-impairing pollutant species: sulfates, nitrates, particulate organic matter, and elemental carbon.

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[29] Jenny L. Hand, et al., *Spatial and Seasonal Patterns and Temporal Variability of Haze and its Constituents in the United States: Report V*, June 2011, posted on the improve website at **http://vista.cira.colostate.edu/improve/publications/Reports/2011/2011.htm**

[30] For more details, see Chapter 9 and Appendix G of the IMPROVE Report V.

The IMPROVE Report V defined the baseline period as 2000 through 2004 and the first trend period as being 2005 through 2009. Since that report was published data is available through 2013. IMPROVE 2010-13 data downloaded from the FED database and updated to current 5-year (2009-13) regional haze conditions were calculated using the same procedures in the IMPROVE Report V. The visibility index used is based on inverse megameters (Mm^{-1}), a measure of light extinction, and the deciview (dv) scale, a logarithmic transformation of light extinction, which for the Regional Haze Rule is derived from IMPROVE aerosol composition data (as described in Appendix E).

Figure 5.4 and Figure 5.5 present trends in visibility at Class I sites in the MANE-VU region from the baseline (2000-04) to the most recent current (2009-13) 5-year period.

Figure 5.4. Visibility Improvements through 2013 by Particle Constituents on Haziest 20% Days in MANE-VU Class I Areas

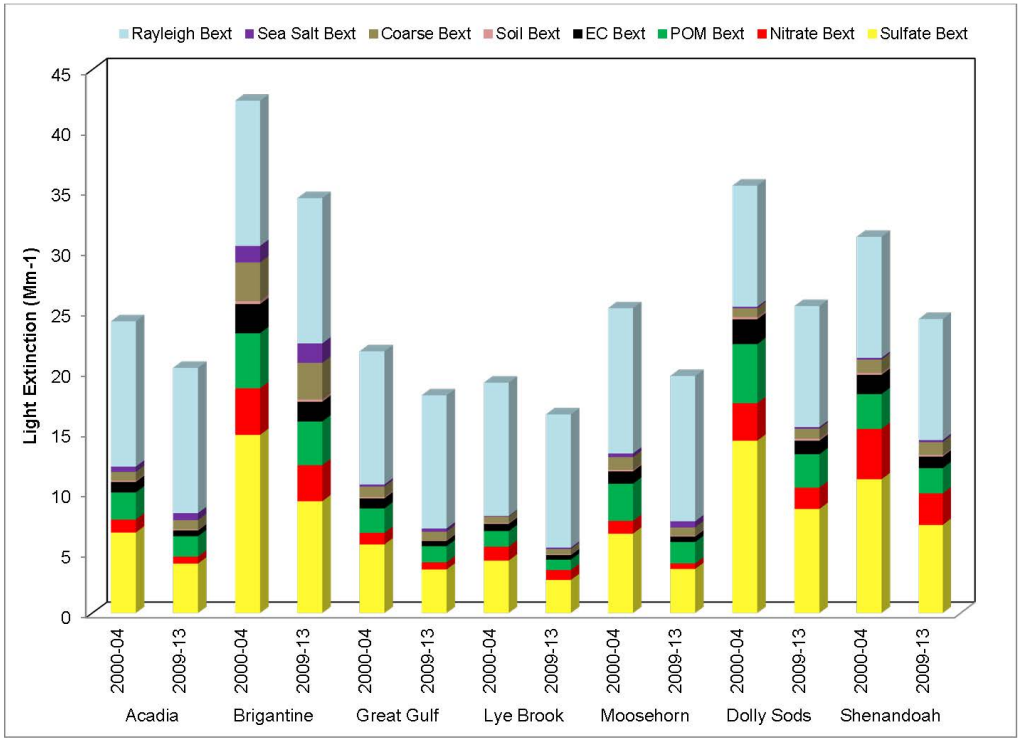
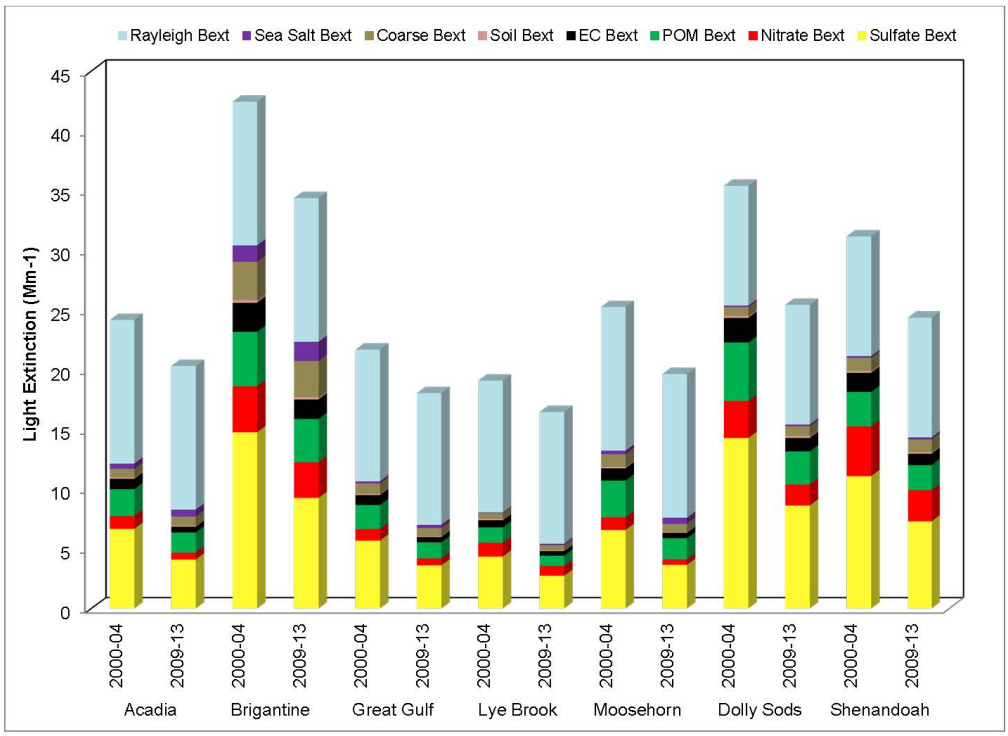


Figure 5.5. Visibility Improvements through 2013 by Particle Constituents on Clearest 20% Days in MANE-VU Class I Areas



5.5. Assessment of Visibility

Connecticut has no Class I areas, thus DEEP is not required by 40 CFR section 51.308(g)(3) to review the visibility improvements. DEEP has included the above section to provide such an assessment as prepared for the MANE-VU region, which does include Class I areas.

During the original collaborative process MANE-VU set uniform rates of progress and RPGs for improving visibility on both the 20% best visibility days and the 20% worst visibility days. The MANE-VU analysis above shows that the visibility in all MANE-VU Class I areas and those just outside the region that were at the time affected by Connecticut and/or other MANE-VU states have surpassed all the reasonable progress and uniform progress goals. Currently, at the half way point to the 2018 deadline, the visibility is on average 20% clearer on both the worst and best visibility days than the start of the regional haze strategies, see Table 5.2.

Section 6: Consultation with Federal Land Managers

The Regional Haze Rule at 40 CFR 51.308(i) requires that the state provide the FLMs responsible for Class I areas affected by emissions from within the state an opportunity for consultation, in person and at least 60 days before holding any public hearing on this progress report SIP.

There is no specific requirement to consult with other states about the 5-year progress report unless the Class I State determines that other states are not adequately implementing their SIPs or controlling emissions to enable reasonable progress in improving visibility at the State's Class I area(s). However, DEEP still included the neighboring states to maintain consistency in the process and to provide the opportunity for comment.

Connecticut sent the draft SIP revision to the FLMs on January 26, 2015. Connecticut will notifiy FLMs of public hearing dates if requested. Connecticut has considered the FLMs comments on the proposed SIP revision, along with other comments (included as Appendix G). Connecticut will continue to coordinate and consult with the FLMs on future SIP revisions, including progress reports, as well as during the implementation of programs having the potential to contribute to visibility impairment in the mandatory Class I areas.

Section 7: Determination of Adequacy of Current Regional Haze SIP

Section 40 CFR 51.308(h) of the Regional Haze Rule requires the State to determine the adequacy of its regional haze SIP based upon information presented in its progress report. Based on the analyses conducted for this report, DEEP determines that the existing SIP is adequate for continued reasonable progress towards natural conditions in all mandatory Class I areas impacted by emissions from Connecticut.

Appendices

Appendix A - Acronyms

BART	Best Available Retrofit Technology
CAA	Clean Air Act
CENRAP	Central Regional Air Planning Association
CenSARA	Central States Air Resource Agencies
EGU	Electricity Generating Unit
EPA	Environmental Protection Agency
FIP	Federal Implementation Plan
FLM	Federal Land Manager
FY	Fiscal Year
IMPROVE	Interagency Monitoring of Protected Visual Environments
LADCO	Lake Michigan Air Directors Consortium
MANE-VU	Mid-Atlantic/Northeast Visibility Union
MARAMA	Mid-Atlantic Regional Air Management Association
METRO4	Southeastern Local Air Pollution Control Agencies
MJO	Multi-Jurisdictional Organization
MOA	Memorandum of Agreement
MRPO	Midwest Regional Planning Organization
NAAQS	National Ambient Air Quality Standards
NESCAUM	Northeast States for Coordinated Air Use Management
NESHAP	National Emission Standards for Hazardous Air Pollutant
NO_X	Nitrogen oxides
NPS	National Park Service
NSPS	New Source Performance Standards
OAQPS	Office of Air Quality Planning and Standards
OAR	Office of Air and Radiation
OTC	Ozone Transport Commission
PM	Particulate matter
$PM_{2.5}$	Particulate matter of diameter of 2.5 micrometers of less
RAVI	Reasonably Attributable Visibility Impairment
RPO	Regional Planning Organization
SESARM	Southeastern States Air Resource Managers
SAMI	Southern Appalachian Mountains Initiative
SIP	State Implementation Plan
SO_2	Sulfur dioxide
URP	Uniform Rate of Progress
VIEWS	Visibility Information Exchange Web System
VISTAS	Visibility Improvement State and Tribal Association of the Southeast
WESTAR	Western States Air Resource Council
WRAP	Western Regional Air Partnership

Appendix B: Status of Emissions from 167 Key Stacks

<See separate spreadsheet prepared by NESCAUM>

Appendix C: Actual and Potential Emissions of Connecticut Alternative BART Units

<see attached spreadsheet titled "Actual and Potential Emissions of Connecticut Alternative BART Units">

Appendix D: National Emissions Inventory for MANE-VU States

<see attached spreadsheet titled " 2011 Emissions Reductions Summary MANEVU Region">

Appendix E: Regional Haze Rule Metric

IMPROVE aerosol sampling and filter analysis at MANE-VU Class 1 sites are conducted according to procedures described in "*IMPROVE Standard Operating Protocols: Particle Monitoring Network"*. (http://vista.cira.colostate.edu/improve/Publications/IMPROVE_SOPs.htm). Data are available from the Federal Land Manager Database: http://views.cira.colostate.edu/fed/QueryWizard/Default.aspx .

The haze-relevant aerosol measurements include PM_{10} mass and $PM_{2.5}$ mass (from which coarse mass is calculated), fine sulfate and nitrate ions (from which ammonium sulfate and ammonium nitrate are calculated), fine organic carbon (from which particulate organic matter is calculated), fine elemental carbon, fine elemental chlorine and chloride ion (from which sea salt mass is calculated), and fine crustal elements (Si, Al, Fe, Ca, Ti – from which fine soil is calculated). The calculated aerosol species concentrations are then combined with estimated dry light extinction efficiencies and enhanced by hygroscopic growth functions (for sulfate nitrate & sea salt) using climatologically derived monthly relative humidity and f(RH) growth functions. This "aerosol light extinction is added to Rayleigh Scattering from natural gaseous air molecules.

The equation presented below used for these extinction calculations – referred to as the IMPROVE Equation, Version II, and recommended by the IMPROVE Steering Committee is described in **"***Review of the IMPROVE Equation for Estimating Ambient Light Extinction Coefficients - Final Report,*" J. L. Hand and W. C. Malm, March 2006, which is posted on the IMPROVE web site at http://vista.cira.colostate.edu/improve/Publications/GrayLit/gray_literature.htm .

$$B_{ext} \approx 2.2 \times f_S(RH) \times [\text{Small } (NH_4)_2SO_4] + 4.8 \times f_L(RH) \times [\text{Large } (NH_4)_2SO_4]$$
$$+ 2.4 \times f_S(RH) \times [\text{Small } NH_4NO_3] + 5.1 \times f_L(RH) \times [\text{Large } NH_4NO_3]$$
$$+ 2.8 \times [\text{Small Organic Mass}] + 6.1 \times [\text{Large Organic Mass}]$$
$$+ 10 \times [\text{Elemental Carbon}] + 1 \times [\text{Fine Soil Mass}]$$
$$+ 1.7 \times f_{SS}(RH) \times [\text{Sea Salt Mass}] + 0.6 \times [\text{Coarse Mass}]$$
$$+ \text{Rayleigh Scattering (Site Specific)} + 0.33 \times [NO_2 \text{ (ppb)}]$$

Where:

B_{ext} = The light extinction coefficient in inverse megameters [Mm^{-1}],

f_S (RH) and f_L (RH) = Humidity factor associated with small and large mode mass size distributions of $(NH_4)_2SO_4$ and NH_4NO_3,

f_{SS} (RH) = Humidity factor associated with Sea Salt,

NO_2 data are not available and concentrations are assumed to be negligible

Apportionment of the total concentrations of ammonium sulfate ($(NH_4)_2SO4$) into the concentrations of small and large size fractions is accomplished using the following equations:

[Large $(NH_4)_2SO_4$] = [Total $(NH_4)_2SO_4$]/20 x [Total $(NH_4)_2SO_4$]

[Small $(NH_4)_2SO_4$] = [Total $(NH_4)_2SO_4$] - [Large $(NH_4)_2SO_4$]

Similar equations are used to apportion total ammonium nitrate (NH_4NO_3) and total particulate organic mass (POM = 1.8 x OC) concentrations into the small and large size fractions.

The above IMPROVE Equation replaced the equation in EPA's September 2003 *Guidance for Tracking Progress Under the Regional Haze Rule* (EPA-454/b-03-004) posted on EPA's website at http://www.epa.gov/ttnamti1/files/ambient/visible/tracking.pdf. Other aspects of that guidance are not affected by the IMPROVE Equation.

The resulting light extinction estimates (B_{ext} in Mm^{-1}) can be converted to deciviews using the following natural logarithm function:

Deciviews (dv) = 10 ln (B_{ext}/10)

For each year meeting data completeness requirements, averages are calculated, in deciviews, for the 20% haziest days and for the 20% clearest days at each site. These annual means are aggregated into 5-year averages for a "baseline" period (2000-2004) and for later 5-year periods.

The EPA Regional Haze Rule target requires that the 20% clearest days not deteriorate over time, while the 20% haziest days are expected to improve visibility to the level of "natural background" by 2064. To achieve a "uniform rate of progress," consistent with reaching natural background by 2064, the haziest 20% days would need to improve at an annual rate of at least:

Annual Uniform Improvement = (Baseline – Natural Background) / 60

For each 5-year period, uniform progress would be maintained if:

5-year Uniform Improvement = (Baseline – Natural Background) / 12

Each state with a Class I area establishes a Reasonable Progress Goal for that Class I area for each 10-year period that is based on decisions about how much progress in reducing regional haze would be reasonable by that date. The first regional haze SIPs set RPGs for 2018. The Uniform Rate of Progress is considered by the state in setting the Reasonable Progress Goal, but the goal must reflect what is considered reasonable, which may be more or less progress than would be expected based on the uniform rate of progress.

Appendix F: Comments of the Connecticut Department of Energy and Environmental Protection on the 2018 Emissions Modeling Platform

Connecticut Department of
ENERGY &
ENVIRONMENTAL
PROTECTION

79 Elm Street • Hartford, CT 06106-5127 www.ct.gov/deep Affirmative Action/Equal Opportunity Employer

June 26, 2014

EPA Docket Center, WJC West (Air Docket)
U.S. Environmental Protection Agency, Mailcode: 2822T
1200 Pennsylvania Ave. NW
Washington, DC 20460
Attention Docket ID No. EPA-HQ-OAR-2013-0809

Re: ***Comments of the Connecticut Department of Energy and Environmental Protection on the 2018 Emissions Modeling Platform***

Dear Docket Administrator:

The Connecticut Department of Energy and Environmental Protection (DEEP) is pleased to have the opportunity to comment on the U.S. Environmental Protection Agency's (EPA's) 2018 emissions modeling platform. DEEP notes that the platform, or portions of the data that make up the platform, may be used by the EPA in several contexts, including the development of rules related to the transport of air pollution and the National Ambient Air Quality Standards. Therefore, it is crucial given the importance of transported air pollution in influencing Connecticut's air quality that the data used to inform the air quality model are as accurate as possible. DEEP provides the following comments on five of the areas for which EPA requested comment on the 2018 modeling platform:

1) Emissions values and supporting data for EGUs

Many of DEEP's comments address this area so that the 2018 modeling platform correctly identifies units located in Connecticut and more accurately represents the operation of and emissions from Connecticut units.

Bridgeport Harbor 3, ORIS 568; Montville 5 and 6, ORIS 546; Middletown 4, ORIS 562; and New Haven Harbor 1, ORIS 6156 and Turndown Constraints

The Integrated Planning Model (IPM) projects that Connecticut's remaining coal-fired unit, Bridgeport Harbor 3, will retire by 2018. While it is possible that the Bridgeport Harbor 3 retirement will occur, DEEP is not aware of any retirement announcements regarding this unit. In addition, Bridgeport Harbor 3 has been bid into Forward Capacity Auction (FCA) 8 and is therefore obligated to provide a capacity commitment from June 1, 2017 through May 31, 2018.

Similarly, IPM projects zero emissions in 2018 from four of Connecticut's oil/gas-fired boilers, namely Montville 5 and 6, Middletown 4, and New Haven Harbor 1 (Montville 6 and Middletown 4 are oil-fired only). Again, while it is possible that there will be no emissions from these units, all of the units have been bid into FCA 8 and are therefore obligated to provide a capacity commitment from June 1, 2017 through May 31, 2018.

It is noted in **Section 3.5.3 Turndown** of the *Documentation for EPA Base Case v5.13 Using the Integrated Planning Model* that turndown assumptions are used to prevent coal and oil/gas steam units from operating strictly as peaking units. The turndown assumptions require coal steam units to dispatch no less than 50% of the unit capacity in the five base-and mid-load segments of the load duration curve

(LDC) in order to dispatch 100% of the unit in the peak load segment of the LDC. Oil/gas steam units are required to dispatch no less than 25% of the unit capacity in the five base- and mid-load segments of the LDC in order to dispatch 100% of the unit capacity in the peak load segment of the LDC. The documentation explains that the turndown constraints were developed through detailed assessments of the historical operating characteristics of the existing fleet of coal steam and oil/gas steam units' capacities.

Data from 2008-2010 show that Montville 5 and 6, Middletown 4 and New Haven Harbor 1 (all burning oil or oil/gas) were all operating at low annual capacity factors (<10%) and were therefore essentially operating as peaking units. EPA's own peaking unit file for the 2011 modeling platform includes Montville 5 and 6, Middletown 4 and New Haven Harbor 1. Data from 2011-2013 show that Bridgeport Harbor 3 (burning coal) had an average annual capacity factor of 13%. It is unlikely that the operation of certain oil- or oil/gas- and coal-fired units as virtual peaking units is limited to Connecticut, and it therefore seems prudent to review and possibly revise existing turndown constraints. ***DEEP recommends that the IPM turndown constraints be reviewed, with regard to recent operational data, and possibly revised to adjust for changing market forces.***

Projected NOx/SO2 emission increases at Municipal Waste Combustors and Tire Burner: Covanta Mid-Connecticut, ORIS 54945, units 11-13; Wheelabrator Bridgeport, ORIS 50883, units 1-3; American Ref-Fuel of SE CT, ORIS 10646, BLR1-BLR2; Wheelabrator Lisbon, ORIS 54758, BW1-BW2; Covanta Bristol Energy, ORIS 50648, UNIT1-UNIT2; Covanta Wallingford Energy, ORIS 50664, B101-B103; Exeter Energy, ORIS 50736, units 1-2

IPM projects large, unrealistic increases in nitrogen oxides (NOx) emissions from Connecticut's municipal waste combustors (MWCs) and tire burners from 2011 to 2018. The total projected increase for these units is 1728 tons. All units, with the exception of those at American Ref-Fuel of SE CT and Covanta Wallingford Energy, are projected to exceed permitted NOx limits.

There is also a projected increase of 689 tons of sulfur dioxide (SO2) from the MWCs and tire burners from 2011 to 2018 with Covanta Wallingford Energy's units projected to exceed permitted SO2 limits of 20.22 tpy/unit (see Attachment 1). Aside from the erroneous predictions that units would exceed permitted limits, municipal waste combustor operations are anticipated to decrease, rather than increase, over time due to recycling efforts. The Connecticut legislature recently enacted a 60% target rate for reducing solid waste disposal by increasing source reduction, recycling, and reuse by January 1, 2024.[1] The current reported recycling rate is under 30%. Furthermore, as part of its Reasonably Available Control Technology (RACT) review as required by the 2008 Ozone National Ambient Air Quality Standard Implementation Rule, DEEP will be undergoing a review of current NOx limitations for Connecticut's MWCs, so overall NOx emissions from the MWCs will likely be reduced through that effort. ***DEEP recommends that Connecticut's MWC and tire burner projected 2018 emissions be revised, after consultation with DEEP, to reflect permit limitations, anticipated revised NOx RACT requirements, and increasing source reduction, recycling, and reuse.***

[1] http://search.cga.state.ct.us/2014/ACT/PA/2014PA-00094-R00SB-00357-PA.htm

New unit projected by IPM

IPM projects that a 439.2 MW oil-fired combustion turbine (Plant Name NENG_CT_CT_Combustion Turbine, ORIS 83640 in NEEDS v5.13) will start operating in Connecticut in 2015. DEEP is not aware of any combustion turbine of this size and fuel type scheduled to start-up in 2015 or beyond. ***DEEP recommends that this unit be removed from NEEDS v5.13 and IPM 2018 projections.***

Correction to Table 3-13

Table 3-13 in **Section 3. Power System Operation Assumptions** of the *Documentation for EPA Base Case v5.13 Using the Integrated Planning Model* includes information on state power sector regulations included in EPA Base Case v.5.13. ***DEEP recommends that the table information for Connecticut be corrected as follows (corrected items are in bold-faced font):***

State/Region	Bill	Emission Type	Emission Specifications	Implementation Status	Notes
Connecticut	Executive Order 19 and Regulations of Connecticut State Agencies (RCSA) **section** 22a-174-22	NOx	0.15 lbs/MMBtu non-ozone seasonal limit for all fossil units ≥ 15 MW	2003	
	Executive Order 19, **RCSA section 22a-174-19a** and Connecticut General Statutes (CGS) 22a-198	SO_2	0.33 lbs/MMBtu **quarterly** rate limit for all fossil units ≥ 25 MW (Title IV sources) 0.55 lbs/MMBtu **quarterly** rate limit for all **fossil** units ≥ 15 MW and <25 MW (non-Title IV sources)		
			0.33 lbs/MMBtu quarterly rate limit for all fossil units ≥ 15 MW	**2014**	
	CGS 22a-199	Hg	**For all coal-fired units, meet a Hg emissions rate = 90% reduction of mercury from the measured inlet conditions for the affected unit or meet an emissions rate of ≤ 0.6 lb Hg/TBtu**	2008	

Energy Efficiency (EE) assumptions in IPM

Section 3.9.8 Energy Efficiency and Renewable Portfolio Standards of the *Documentation for EPA Base Case v5.13 Using the Integrated Planning Model* includes a discussion of how Renewable Portfolio Standard requirements are represented in IPM, but does not appear to include a discussion of how EE requirements are represented in IPM. ***DEEP recommends that EPA include a discussion of how EE requirements are represented in IPM in Section 3.9.8 of the Documentation for EPA Base Case v5.13.***

Connecticut peaking units

EPA requests comment on the specific units that are expected to be used as peaking units in the future year and on the nature of the expected 2018 emissions from these units. DEEP provides comment on three categories of peaking units in Connecticut:

A) Simple-cycle oil-fired combustion turbines without Continuous Emissions Monitors (CEMS)

In 2018, IPM projects no emissions from Waterside Power 4, 5 and 7, ORIS 56189; Branford UN10, ORIS 540; Bridgeport Harbor 4, ORIS 568; Cos Cob 10-14, ORIS 542; Devon 10, ORIS 544; Tunnel 10, ORIS 557;

Franklin Drive UN19, ORIS 561; Middletown 10, ORIS 562; South Meadow 11-14, ORIS 563; Torrington Terminal UN10, ORIS 565; and Norwich 5, ORIS 581. The units are used for peaking purposes during periods of high electrical demand, and it is likely that one or more of the units will operate in 2018. All of the units are bid into FCA-8.

DEEP further observes that EPA's peaking unit file in the 2011 Modeling Platform does not include any of these units. In its 2011 Modeling Platform comments[2], DEEP provided EIS identifiers matched to ORIS facility/unit ID for Connecticut's combustion turbines without CEMS. DEEP also provided 2011 temporal operations and emissions for most of the combustion turbines without CEMS.

Regarding expected 2018 emissions from Connecticut's simple-cycle oil-fired combustion turbines without CEMS, DEEP recommends that EPA use the 2011 NEI emissions provided in Attachment 1 of DEEP's 2011 Modeling Platform comments for Cos Cob 10-14, 2012 EMIT emissions provided in Attachment 2 of DEEP's 2011 Modeling Platform comments for Waterside Power 4, 5 and 7 and 2011 temporal operations and emissions provided in Attachment 3 of DEEP's 2011 Modeling Platform comments for Branford UN10, Bridgeport Harbor 4, Devon 10, Tunnel 10, Franklin Drive UN19, Middletown 10, South Meadow 11-14, Torrington Terminal UN10 and Norwich 5 (see footnote 2 for DEEP's 2011 Modeling Platform comments) as surrogates for projecting future year emissions.

B) Simple-cycle combustion turbines with CEMS

Regarding expected 2018 emissions from Connecticut's simple-cycle combustion turbines with CEMS (AL Pierce, ORIS 6635, unit AP-1; Devon, ORIS 544, units 11-18; Middletown, ORIS 562, units 12-15; New Haven Harbor ORIS 6156, units NHHS2-NHHS4; Wallingford Energy, ORIS 55517, units CT01-CT05; and Waterbury Generation, ORIS 56629, unit 10), DEEP offers that either ERTAC v2.2 2018 projected emissions or 2018 projected emissions from IPM are plausible projections of future year emissions.

C) Oil-fired boilers and coal-fired boiler

DEEP references the discussion and recommendation in the earlier comment regarding turndown constraints for Bridgeport Harbor 3, Montville 5 and 6, Middletown 4, and New Haven Harbor 1. As unit operations have decreased significantly in recent years, these units may be used as peaking units in 2018.

Regarding expected 2018 emissions from Bridgeport Harbor 3, Montville 5 and 6, Middletown 4 and New Haven Harbor 1, DEEP recommends that EPA use the ERTAC v2.2 2018 projected emissions for Bridgeport Harbor 3, Middletown 4 and Montville 6, and 2011 NEI data for Montville 5 and New Haven Harbor 1 as surrogates for projecting future year emissions. Attachment 2 provides a compilation of possible Connecticut peaking units in 2018 along with references for recommended projected future year emissions.

Mismatches between CAMD's AMPD and NEEDS v5.13

DEEP notes that there are many data mismatches, based on facility name, unit ID, or unit configuration, between Clean Air Market's Division (CAMD) Air Markets Program Data (AMPD) and NEEDS v5.13. Indeed, the reader may note that DEEP's references in this letter to facilities/unit identifiers may not match the corresponding information in NEEDS v5.13, and that is why DEEP provided ORIS Plant Codes

[2] http://www.ct.gov/deep/lib/deep/air/regulations/comments_other/Connecticut_DEEP_EMP_Comments.pdf

when referring to facilities/units. DEEP further notes that many of the mismatches occur between simple cycle and combined cycle units. ***DEEP recommends including a unit level identifier such as an EIS identifier, or the CAMD Database Unit ID, in both AMPD and NEEDS to facilitate unit matching.*** Not only would this improve CEMS temporalization profiles in IPM, but it would also improve comparisons of NEEDS with other databases used for modeling purposes, such as the NEI and ERTAC EGU. In its 2011 Modeling Platform comments, DEEP provided a crosswalk with EIS identifiers/ORIS code/ORIS ID for Connecticut's EGUs and other point sources.

Incorrect ORIS plant codes/facility IDs and missing NOx combustion/post-combustion controls in NEEDS for Devon 15-18, ORIS 544 and Middletown 12-15 ORIS 562

AMPD includes the Facility Name "Devon" and ORISPL 544 for units 15-18 while NEEDS v5.13 includes a Plant Name of GenConn Devon LLC and ORIS Plant Code of 57070. Also, AMPD includes the Facility Name "Middletown" and ORISPL 562 for units 12-15 while NEEDS v5.13 includes a Plant Name of GenConn Middletown LLC and ORIS Plant Code of 57068. ***DEEP recommends that the Facility Names and ORISPLs for these units in NEEDS v5.13 be changed to the AMPD Facility Names and ORISPLs.***

NEEDS v5.13 does not include NOx combustion controls and NOx post-combustion controls for Devon 15-18 and Middletown 12-15. Consequently, the NOx emission rates in NEEDS v5.13 are much higher than permitted NOx rates. ***DEEP recommends adding "H2O" to the NOx combustion control column and "SCR" to the NOx post-combustion control column of NEEDS v5.13. DEEP further recommends changing the NOx rate for Devon 15-18 and Middletown 12-15 to 0.0092 lbs/MMBtu (gas-fired permit rate)/0.023 lbs/MMBtu (oil-fired permit rate) instead of 0.7315 lbs/MMBtu in NEEDS v5.13.***

AL Pierce, ORIS 6635 NOx combustion controls

DEEP recommends that EPA remove the "DLNB & H2O" entry in the NOx combustion control column in NEEDS v5.13. The unit has a GE OpFlex system for maximizing output and regulating pollutant emissions simultaneously, but does not have DLNB and H2O.

Branford, ORIS 540 NOx combustion controls

DEEP recommends that EPA remove the "H20" entry in the NOx combustion control column in NEEDS v5.13. The unit is uncontrolled.

Cos Cob ORIS 542 UN10-UN12 SO2 permit rate (lb/MMBtu)

DEEP recommends that EPA change the SO2 permit rate from 0.55 to 0.0015 lb/MMBtu for Cos Cob UN10-UN12 in NEEDS v5.13. UN10-UN12 are limited to the lower SO2 rate as a collateral condition in the permits for UN13-UN14.

Plainfield Renewable Energy

Plainfield Renewable Energy, a 37.5 MW biomass fluidized bed gasification power plant, began operating in 2013. DEEP has added the facility to the NEI, and the plant parameters and identifiers are provided in Attachment 3 of this letter. ***DEEP recommends that EPA add Plainfield Renewable Energy to NEEDS.***

Bridgeport Harbor 2, ORIS 546; Norwalk Harbor 1, 2 and 10, ORIS 548

DEEP notes that the oil-fired boiler Bridgeport Harbor 2 is not listed in NEEDS v5.13. Although PSEG Power Connecticut LLC revoked Bridgeport Harbor 2's registration in December 2013 and the unit is no longer operating, ***DEEP recommends that EPA include Bridgeport Harbor 2 on the NEEDS***

5.13v3_Retired_by 2016 tab in NEEDS v5.13. DEEP also recommends that Norwalk Harbor 1, 2, and 10 be moved from the NEEDS 5.13v3_Active tab to the NEEDS 5.13v3_Retired_by 2016 tab as the units were retired in 2013.

Bridgeport Energy, ORIS 55042
DEEP recommends that EPA add "LNB" to the NOx combustion control column in NEEDS v5.13.

Milford Power, ORIS 55126
DEEP recommends that EPA remove "H2O" from and add "LNB" to the NOx combustion control column in NEEDS v5.13.

New Haven Harbor, ORIS 6156, units 2-4
DEEP recommends that EPA remove "DLNB" from the NOx combustion control column (but leave "H2O") and add "SCR" to the NOx post-combustion control column in NEEDS v5.13.

Wallingford Energy LLC, ORIS 55517, units CTG1-CTG5
DEEP recommends that EPA remove "H2O" from and add "LNB" to the NOx combustion control column in NEEDS v5.13.

SO2 permit rate for North Main Street, ORIS 581, unit 5; Bridgeport Station, ORIS 568, unit 4; Torrington Terminal, ORIS 565, UN10; South Meadows, ORIS 563, units 11-14; Middletown, ORIS 562, unit 10; Franklin Drive, ORIS 561, UN19; Tunnel, ORIS 557, unit 10; Branford, ORIS 540, UN10, Devon, ORIS 544, unit 10
DEEP recommends changing the SO2 permit rate from 0.55 lb/MMBtu to 0.33 lb/MMBtu for North Main Street unit 5, Bridgeport Station unit 4, Torrington Terminal UN10, South Meadows units 11-14, Middletown unit 10, Franklin Drive UN19, Tunnel unit 10, Branford UN10, and Devon unit 10 because the applicable regulatory limit in Regulations of Connecticut State Agencies section 22a-174-19a was revised in 2014.

NOx rates for Branford, ORIS 540, UN10; Cos Cob, ORIS 542, UN10-UN14; Devon, ORIS 544, unit 10; Franklin Drive, ORIS 561, UN19; Middletown, ORIS 562, unit 10, and Torrington Terminal, ORIS 565, UN10
It appears that default NOx rates from AMPD are used for Branford UN10, Cos Cob UN10-UN14, Devon unit 10, Franklin Drive UN19, Middletown unit 10 and Torrington Terminal UN10. All of these units have been stack tested within the last five years, and the stack tested NOx rates are substantially lower than the AMPD default NOx rate of 1.2 lbs/MMBtu. ***DEEP recommends using the most recent NOx stack test rate of 0.616 lb/MMBtu for Branford UN10; 0.152, 0.173, 0.188, 0.153 and 0.188 lb/MMBtu respectively for Cos Cob UN10-UN14; 0.709 lb/MMBtu for Devon unit 10; 0.68 lb/MMBtu for Franklin Drive UN19, 0.606 lb/MMBtu for Middletown unit 10, and 0.707 lb/MMBtu for Torrington Terminal UN10 in NEEDS v5.13.***

2) Model inputs and activity data used to develop mobile source emission inventories
EPA requests comment on the mobile source model input data (including both the databases used to create emission factors and the vehicle miles traveled (VMT) and vehicle population activity data used to compute the emissions) used to develop the projected future mobile source emission inventories.

DEEP has provided updated extended idle run hours based on EPA national estimates and fractional national demand presented in an EPA analysis. DEEP intends to continue working with Virginia, Georgia, the University of North Carolina, MARAMA, EPA OTAQ and EPA OAQPS to support improved extended idle emission estimates. DEEP intends to provide the University of North Carolina coordinates and truck stop data to support efforts to better estimate and support detailed Sparse Matrix Operator Kernel Emissions (SMOKE) grid allocations for these extended idle emissions in support of the 2011 modeling platform. ***DEEP recommends that EPA use the latest data that DEEP has provided and the updated methodology as part of the ongoing extended idle data improvement efforts.***

DEEP intends to provide 2018 MOVES inputs in support of the 2011 Modeling Platform. These 2018 MOVES inputs, including VMT, will be loaded into EIS, will not reflect increased diesel sales data, and will be based on current EPA converters upgraded to accommodate current Federal Highway Administration Highway Performance Monitoring System definitions. DEEP has not implemented enhancement for future projections of fuel type or vehicle mix in these inputs and DEEP understands that some improvements may be possible based on Annual Energy Outlook (AEO) projections. ***DEEP recommends that EPA use the 2018 MOVES inputs provided by DEEP with augmentation as deemed appropriate (i.e. projected fuel type, vehicle mix) in future modeling efforts.***

DEEP recommends that EPA include documented issues for MOVES and converters in the frequent questions on the MOVES website, as identified in Attachment 4 of this letter, so that stakeholders can make an informed decision on what is needed to properly model emissions using MOVES. Unfortunately, states are often not aware of these data or the limitations hidden in the MOVES converters and are not aware of data assumptions embedded in the MOVES model itself. DEEP acknowledges that EPA may not act to provide documentation on the 2018 modeling platform timeframe but hopes that EPA will do so at some point in the future.

DEEP recommends that EPA treat diesel sales fractions as year specific data and apply an age distribution to obtain a reasonable estimate of VMT driven by diesel versus gasoline vehicles. Section 4.3.1.1 of EPA's draft technical support document, entitled "VMT and vehicle population", used AEO projections to estimate projection factors for 2018 VMT for light duty truck and light duty passenger vehicles. The EPA methodology uses a direct ratio for diesel sales counts for a base and future year only, which may not be appropriate in all circumstances and is not very accurate. Mobile inputs have applied the age distribution to national diesel sales fractions when local diesel allocation data is not available. The practice of applying the age distribution acknowledges that not every car in 2011 is a 2011 model year and not every car in 2018 is a 2018 model year.

DEEP further recommends that these improved diesel fuel allocations be incorporated into MOVES 2014 default databases. The concept of applying AEO projections to improve MOVES emission estimates and incorporation of this data into the MOVES2014 default database appears to be worthwhile. MOVES2010b defaults appear to be low for 2011, future years and possibly earlier years.

DEEP agrees with EPA's attempts to characterize changes in the fleet using AEO data but has some concerns. ***DEEP recommends that EPA develop defined procedures for states to use as a methodology when projecting future year emissions.***

3) Projection data and methods

EPA seeks comment on the data used to project point and nonpoint source emissions from 2011 to 2018, and on the methods and assumptions used to implement the projections. In particular, EPA seeks comment on its assumptions regarding the manner in which state-specific control programs will be implemented.

Aircraft Emissions Estimates

DEEP believes that the use of 2013 Federal Aviation Administration (FAA) Terminal Area Forecast (TAF) data would provide a more conservative and better estimate of aircraft emissions for Connecticut than that provided by the current 2012 FAA TAF data. DEEP also believes that the EPA methodology is overly complex and does not endorse replacing FAA TAF data with national averages. The EPA methodology does not present a significant emission impact for 2018 activity estimates, but DEEP is concerned that EPA is throwing out reliable FAA TAF data and replacing it with calculated averages. DEEP also raises caution that FAA TAF data should be the basis for projections to other years past 2018 and not the general growth rates estimates generated for bringing 2011 activity to 2018 activity. The restrictions imposed on FAA TAF data for airport projections eliminate good data. The elimination of zero growth FAA TAF data and replacement with a national average does not appear to be warranted. The elimination of FAA TAF data when counts are less than 1000 could be warranted if projected growth rates were not for an explicit year, but the FAA TAF data is year specific and does not need this special treatment. Growth of the inventory activity data does require special treatment when the base year count is zero. ***DEEP recommends that EPA use 2013 FAA TAF data rather than the EPA projection methodology for projecting future year aircraft emissions.***

Non-IPM Point and Non-Point Growth and Control Factors

In Section 4.2 of the draft "Technical Support Document (TSD): Preparation of Emissions Inventories for the Version 6.0, 2011 Emissions Modeling Platform" (February 26, 2014), EPA indicates that:

> *"In estimating future year emissions, EPA assumed that emissions growth does not track with economic growth for many stationary non-IPM sources. This "no-growth" assumption is based on an examination of historical emissions and economic data. While EPA is working toward improving the projection approach in future emissions platforms, the Agency is still using the no-growth assumption for the 2011 platform unless states provided specific growth factors for 2018."*

EPA's draft 2018 base-case inventory uses this no-growth assumption for a variety of non-IPM emission categories, most notably for all stationary source fuel combustion occurring in industrial, commercial/institutional and residential applications, except for residential wood burning. Connecticut worked with other Northeast states, as part of a workgroup organized by the Mid-Atlantic Air Management Association (MARAMA), to examine the appropriateness of EPA's proposed growth factors for developing inventories for use with the Emission Modeling Framework (EMF) in upcoming regional modeling applications for ozone, fine particles and regional haze. In general, Connecticut and most other states agreed that projected growth of non-IPM source emissions could be better approximated using surrogates such as the 2014 Annual Energy Outlook (AEO) regional fuel consumption projections developed by the U.S. Energy Information Administration, state-level employment projections, state-level population projections, or other available data. Many states, including Connecticut, also agreed that it was appropriate to use EPA-developed growth/control factors for several categories (e.g., residential wood burning, gasoline distribution, portable fuel containers, commercial marine vessels and railroad equipment).

At DEEP's request, MARAMA's contractor (Ed Sabo of SRA International) is submitting a separate comment letter and data files to the docket describing specific Non-IPM Point and Non-Point growth factors, as well as control files for certain state-specific control programs, that DEEP would like EPA to use to calculate 2018 emissions for Connecticut. The files provided by SRA will also include the source of the data and, in some cases, explanatory comments. ***DEEP requests that EPA use these factors when developing the final 2018 inventory.***

DEEP also requests that EPA's final documentation for the 2018 inventory decouple the growth and control portions of each growth/control factor that EPA included in the 2018 inventory proposal. Doing so will ensure greater transparency of EPA's methodology by providing an explicit breakdown of the portion of each factor that is due to growth and the portion that is due to required controls. This information will also assist states with applying the same approach when developing inventories for other years (e.g., 2028 regional haze inventories).

Connecticut Fuel Sulfur Limits

DEEP recently noticed that EPA's 2011 inventory includes sulfur dioxide emission factors for distillate and residual fuel oil used by industrial and commercial/institutional boilers that are incorrect for Connecticut. EPA used a distillate oil emission factor of 0.426 lbs/1000 gallons (approximately 30 ppm sulfur) for SCCs 2102004001 and 2103004001, while the correct emission factor for Connecticut in 2011 should be 42.6 lbs/1000 gallons (approximately 3,000 ppm sulfur). EPA used a residual oil emission factor of 353.25 lbs/1000 gallons (approximately 22,500 ppm sulfur) for SCCs 2102005000 and 2103005000, while the correct emission factor for Connecticut in 2011 should be 142 lbs/1000 gallons (approximately 10,000 ppm). DEEP did not refer to these discrepancies in our comments on the 2011 emission modeling platform. Based on a review of 2011 EPA documentation, it appears that the error on the distillate emission factor may have been applied to multiple states.

DEEP would prefer, if possible, for EPA to make the corrections noted above in the 2011 inventory. However, the control factor files that SRA is submitting to the docket on DEEP's behalf (see above) assume that such corrections to the 2011 data will **not** occur. ***The SRA control percentages for the applicable SCCs assume the 2011 inventory values remain uncorrected and are set at a level that produces 2018 emissions consistent with sulfur limits that will be in place at that time (i.e., 15 ppm sulfur for distillate oil and 3,000 ppm for residual oil). Those control percentages will not be applicable if EPA decides to correct the 2011 inventory. If EPA does update the 2011 inventory, DEEP will be pleased to provide the updated control file to EPA.***

4) Existing control techniques

EPA seeks comment on whether information on existing controls given in the inventory flat files is incomplete or erroneous. DEEP provided control device codes for the EGU point source emission units in the Attachment 4 tab of its 2011 Modeling Platform comments (see footnote 2 of this letter) and indicated that DEEP intends to submit control device code categories for other sectors of the NEI at a later date (at the end of 2014 or early 2015). Also, in its 2011 Modeling Platform comments, DEEP recommended that EPA provide a control device code for Low Sulfur Content Fuel. ***DEEP requests that EPA implement these requested control device code changes for EGUs.***

5) Temporal allocation

EPA seeks comment on the allocation of the emission inventories to month, day and hour for all types of emission processes. In particular, the EPA seeks information that could help improve the temporal allocation in 2018 of emissions from several source categories, including EGUs. As mentioned in the comment on Connecticut peaking units, DEEP provided 2011 temporal operations and emissions for most of the non-CEM combustion turbines in its 2011 Modeling Platform comments (see footnote 2 of this letter). ***DEEP recommends that EPA consider these data when temporalizing future year emissions.***

DEEP appreciates the opportunity to comment on this modeling platform. If you have any questions regarding this letter, please do not hesitate to contact Wendy Jacobs at 860-424-3457.

Sincerely,

Gary S. Rose, Director
Engineering & Enforcement Division

ATTACHMENT 1 Connecticut Municipal Waste Combustor 2011 Actual, 2018 projected and permitted NOx/SO2 emissions

Plant Name/Unit ID/ORIS Plant Code	EIS Identifiers	Actual 2011 NOx emissions (tons)	Projected NOx total from IPM v5.13 parsed files for 2018 (tons)	Projected NOx increase from 2011 to 2018 (tons)	Permitted NOx emissions (tpy)	Actual 2011 SO2 emissions (tons)	Projected SO2 total from IPM v5.13 parsed files for 2018 (tons)	Projected SO2 increase from 2011 to 2018 (tons)	Permitted SO2 emissions (tpy)
Covanta Mid-Connecticut 11, ORIS 54945	46362913	260	442	182	420	3.89	104.6	100.71	457
Covanta Mid-Connecticut 12, ORIS 54945	46362613	267	442	175	420	9.88	104.6	94.72	457
Covanta Mid-Connecticut 13, ORIS 54945	46362713	276	442	166	420	8.8	104.6	95.8	457
Wheelabrator Bridgeport 1, ORIS 50883	46285713	401	578	177	501	16.56	81	64.44	455.6
Wheelabrator Bridgeport 2, ORIS 50883	46285513	413	578	165	501	21.69	81	59.31	455.6
Wheelabrator Bridgeport 3, ORIS 50883	46285613	406	578	172	501	21.99	81	59.01	455.6
American Ref-Fuel of SE CT BLR1, ORIS 10646	46284313	202	223	21	332.9	35.9	40.6	4.7	350
American Ref-Fuel of SE CT BLR2, ORIS 10646	46284413	197	223	26	332.9	24.59	40.6	16.01	350
Wheelabrator Lisbon BW1, ORIS 54758	962013	117	190	73	148	18.92	38.6	19.68	42.45
Wheelabrator Lisbon BW2, ORIS 54758	961813	126	190	64	148	22.03	38.6	16.57	42.45
Covanta Bristol Energy UNIT1, ORIS 50648	46158013	96	272	176	112	10.112	28	17.888	37.9
Covanta Bristol Energy UNIT2, ORIS 50648	46157913	151	305	154	191.7	6.434	28	21.566	37.7
Covanta Wallingford Energy B101, ORIS 50664	46137513	47	61	14	88.7	2.002	32	29.998	20.22
Covanta Wallingford Energy B102, ORIS 50664	46137613	17	76	59	88.7	0.868	32	31.132	20.22
Covanta Wallingford Energy B103, ORIS 50664	46137713	47	76	29	88.7	1.41	32	30.59	20.22
Exeter Energy LP 1-2 (tire burners), ORIS 50736	41346813 41346613	70	145	75	124.95	64.9	91.5	26.6	109.27
Total		**3093**	**4821**	**1728**	**4419.55**	269.976	958.7	688.724	3768.23

ATTACHMENT 2 Possible Connecticut peaking units in 2018

Simple cycle oil-fired combustion turbines without CEMS					
Facility Name	ORIS	Unit ID	EIS Identifier	CAMD Database Unit ID	Expected future emissions
Branford	540	UN10	107730213	326	See Attachment 3 of footnote 2
Bridgeport Harbor	568	4	46285813	374	See Attachment 3 of footnote 2
Cos Cob	542	10	41011413	327	See Attachment 1 of footnote 2
Cos Cob	542	11	41011313	328	See Attachment 1 of footnote 2
Cos Cob	542	12	41011213	329	See Attachment 1 of footnote 2
Cos Cob	542	13	99525313	90364	See Attachment 1 of footnote 2
Cos Cob	542	14	99525213	90365	See Attachment 1 of footnote 2
Devon	544	10	46136913	330	See Attachment 3 of footnote 2
Franklin Drive	561	UN19	107732013	350	See Attachment 3 of footnote 2
Middletown	562	10	46361313	352	See Attachment 3 of footnote 2
Norwich	581	5	107730113	5083	See Attachment 3 of footnote 2
South Meadow	563	11	46362813, 46362513	357	See Attachment 3 of footnote 2
South Meadow	563	12	46362413, 46362313	360	See Attachment 3 of footnote 2
South Meadow	563	13	46362213, 46362113	363	See Attachment 3 of footnote 2
South Meadow	563	14	46362013, 46361913	365	See Attachment 3 of footnote 2
Torrington Terminal	565	UN10	107732013	370	See Attachment 3 of footnote 2
Tunnel	557	10	107730013	349	See Attachment 3 of footnote 2
Waterside Power	56189	4	88748813	89487	See Attachment 2 of footnote 2
Waterside Power	56189	5	88748913	89488	See Attachment 2 of footnote 2
Waterside Power	56189	7	88749013	89718	See Attachment 2 of footnote 2

Simple cycle combustion turbines with CEMS								
Facility Name	ORIS	Unit ID	EIS Identifier	CAMD Database Unit ID	ERTAC v2.2 projected 2018 NOx emissions (tons)	ERTAC v2.2 projected 2018 SO2 emissions (tons)	2018 IPM projected NOx emissions (tons)	2018 IPM projected SO2 emissions (tons)
AL Pierce (CMEEC)	6635	AP-1	88754513	90114	2	0	0.108	0
Devon	544	11	46136613	331	1	0	0.779	0
Devon	544	12	46136113	332	1	0	0.747	0
Devon	544	13	46136513	333	1	0	0.772	0
Devon	544	14	46136213	334	1	0	0.903	0
Devon	544	15	99521413	NA	0	0	0.7315	0
Devon	544	16	99521313	NA	0	0	0.7315	0
Devon	544	17	99521713	NA	0	0	0.7315	0
Devon	544	18	99521613	NA	0	0	0.7315	0
Middletown	562	12	99518713	NA	0	0	0.7315	0
Middletown	562	13	99518613	NA	0	0	0.7315	0
Middletown	562	14	99518513	NA	0	0	0.7315	0
Middletown	562	15	99518413	NA	0	0	0.7315	0
New Haven Harbor	6156	NHHS2	107238213	NA	10	1	0.08	0
New Haven Harbor	6156	NHHS3	107238013	NA	10	1	0.08	0
New Haven Harbor	6156	NHHS4	107238113	NA	10	1	0.08	0
Wallingford Energy	55517	CT01	88753913	4927	1	0	0.011	0
Wallingford Energy	55517	CT02	88754013	4928	1	0	0.01	0
Wallingford Energy	55517	CT03	88754113	4929	2	0	0.012	0
Wallingford Energy	55517	CT04	88754213	4930	2	0	0.01	0
Wallingford Energy	55517	CT05	88754313	4931	2	0	0.012	0
Waterbury Generation	56629	10	99539613	90207	20	0	0.065	0

Oil-fired boilers and coal-fired boiler								
Facility Name	ORIS	Unit ID	EIS Identifier	CAMD Database Unit ID	ERTAC v2.2 projected 2018 NOx emissions(tons)	ERTAC v2.2 projected 2018 SO2 emissions (tons)	2011 NEI NOx emissions (tons)	2011 NEI SO2 emissions (tons)
Bridgeport Harbor	568	3	46286413	373	366	505	NA	NA
Montville	546	5	48259613	343	NA	NA	7.8	11.1
Montville	546	6	48259513	344	3	5	NA	NA
Middletown	562	4	46360913	355	5	15	NA	NA
New Haven Harbor	6156	1	46449613	2815	NA	NA	50.3	67.6

ATTACHMENT 3

Plainfield Renewable Energy LLC
EIS Facility ID: 16734111
T-Town P-Premise C-Client: T145 P0074 C08589
Facility Name: PLAINFIELD RENEWABLE ENERGY LLC
NAICS Code: 221118 - Other Electric Power Generation

EIS Emissions Unit ID: 107797313
PointID: P0049 (CTBAM)
Emissions Unit Description: Biomass Fluidized Bed Gasification Plant
Design Capacity: 523.0 Million BTU per hour

ATTACHMENT 4

Issues with MOVES converters

MOVES Frequent Questions provides only two high level introduction entries for converters that can be used to transition from MOBILE62 to MOVES. There are no MOVES Frequent Questions identifying known issues for converters or available alternatives. EPA can better support states in finding and resolving issues with MOVES input processing by including documented issues for MOVES and converters in MOVES Frequent Questions so that stakeholders can make an informed decision on what is needed to model emissions properly using MOVES. Examples of issues that have not been identified that could impact the 2011 modeling platform are as follows:

DEEP updated the EPA's **vmt-converter-road-veh16-20100209.xls** to align with the 14 HPMS Road Types defined in current FHWA standard. This improved VMT mapping and ramp fraction inputs. This was an improvement that was implemented for Connecticut, but may not have been considered in other states.

Diesel sales data used in the EPA's **vmt-converter-road-veh16-20100209.xls** and **reg-distrib-converter-veh16-20100209.xls** are fixed at 1996 sales percentages, which under estimates diesel populations and VMT for both the base and future years. A proposed draft 16 vehicle VMT converter updated structure has been provided to MOBILE@EPA.gov for consideration. It is anticipated that this converter would provide improved updated results, when provided diesel sales data for 1996 thru 2050. Refinements to diesel sales fractions improve vehicle VMT mapping in the converter but do not improve fuel fractions applied to MOVES calculations. The benefit of this update cannot be quantified until data is provided.

EPA's **vmt-converter-road-veh16-20100209.xls** appears to use a single VMT mix without MOVES road class based localization, but it is not clear what impact this has on HPMSVTypeID VMT allocations. Connecticut and other states noted significantly more passenger vehicle populations than truck populations and reallocated VMT and population to Source Type Population 20 from Source Type Populations 31 – passenger truck and 32 – light commercial truck. DEEP expected some changes in Source Type Populations 31 and 32 inputs when the lightest portion of the duty truck population was reduced. Other than a minor shift between the two source types involved, not much changed. DEEP anticipated a change in some MOVES inputs to account for the elimination of a significant population of the smaller and cleaner vehicles in Source Type Populations 31 and 32, but this concern has not been resolved. Regulatory class assignments within Source Type Populations 31 and 32 are fixed in MOVES and in regulatory guidance via MOBILE62 vehicle mappings. The issue of reallocation between Source Type Populations 20, 31 and 32 also calls into question the appropriate fuel type fractions to assign. Heavier trucks are more often diesel than lighter trucks. Also, it is expected that alternative fuels and electrification would have greater traction in light trucks in the future. Past practices localized VMT data with HPMS counts for the HPMS Road Types mapped to the MOBILE62 facility type, but MOVES now works off a completely different paradigm, which uses the single mix to estimate an appropriate RoadTypeDistribution and VMT for HPMSVtypeID – year. The converter also estimates HourVMTFraction without knowing hourly speeds. EPA has suggested that each state develop its own conversion process. However, states have limited resources and find comfort in using a globally accepted process that is shared by others facing the same challenges. The converter process is complex, and not all changes are an improvement for every state.

Appendix G: FLM Consultation and Public Hearing Comments

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DEEP appreciates the effort and time the FLMs and EPA have taken to provide Connecticut with the comments outlined below.

U.S. Department of the Interior: National Parks Service Comments

Comment:

> *"In Section 4, DEEP described Connecticut emissions from the 2002 and 2011 National Emissions Inventory (Table 4.2) and the 2018 MANE-VU regional emissions (Table 4.2) that were used in regional air quality modeling to set 2018 visibility goals. We suggest that you add the Connecticut 2018 emissions to Table 4.1 so that the reader can compare 2011 actual emissions to 2018 assumptions. This will strengthen DEEP's demonstration that Connecticut is on track to meet 2018 goals."*

Response:

DEEP agrees that an additional table column would be a useful tool for tracking the states progress and the addition has been made to Table 4.1. DEEP also determined that separating the biogenic emissions from the area would be more representative of the controllable emissions. Emissions were also updated to reflect the recently updated 2011 NEI.

	NO_x Emissions (TPY)				SO_2 Emissions (TPY)			
Connecticut	2002	2008	2011	2018*	2002	2008	2011	2018*
Point	12,867.7	8,580.5	6,403.9	10,919	16,027.4	5,551.9	1,270.1	8,765
Non-Road	22,978.6	15,834.8	13,046.5	16,233	2,385.5	245.7	37.8	815
On-Road	66,812.6	51,619.0	36,659.2	14,787	1,667.1	334.4	281.5	366
Area	12,554.1	17,045.2	16,718.6	11,795	18,454.3	13,310.9	13,744.4	534

	$PM_{2.5}$ Emissions (TPY)				VOC Emissions (TPY)			
Connecticut	2002	2008	2011	2018*	2002	2008	2011	2018*
Point	1,201.3	533.0	441.8	1,864	4,906.7	1,246.7	1,042.0	4,372
Non-Road	1,875.0	1,349.4	1,221.5	1,135	33,208.6	24,281.5	16,826.7	20,694
On-Road	1,066.5	1,824.5	1,142.9	500	47,757.4	26,450.8	21,669.0	10,768
Area	13,220.7	12,483.5	13,739.3	9,635	105,949.7	34,044.8	40,271.5	68,395

* Emissions estimates are the 2018 RPGs of the original SIP submission.

U.S. Department of Agriculture: Forest Service

Comment:

"In Table 2.2 (Potential NOx Emissions from BART Eligible Sources), there is a "Percent Reduced column. A table similar to this for SO2 would be helpful to assist the reader in understanding the potential SO2 emission reductions from BART eligible Sources; in particular the inclusions of "Percent Reduction" column and additions of "BART Only Total" and "Alternative BART total" rows in this suggested table would be helpful. This would be in addition to the existing table 2.1 (Actual SO2 Emissions trends for Connecticut's Post 2002 NOx Budget Units), and existing Figures and Tables in Section 4."

Response:

DEEP agrees and has made the following amendments to Table 2.1:

BART Eligible Unit	Potential SO2 Emissions (TPY)					Percent Reduction 2001 to 2014	2012 Expected from BART	
	2001	2002	2006	2011	2014		MANE-VU Recommended	EPA Recommended
Fusion Paperboard (Formerly Cascades Boxboard), PFI Boiler	1,325	662	662	662	662	50%	662	1,325
Middletown, 3	5,709	5,709	3,426	3,426	3,426	40%	3,426	11,419
Middletown, 4	11,284	11,284	6,770	6,770	6,770	40%	6,770	22,568
Montville Power LLC, 6	22,442	11,221	6,733	6,733	6,733	70%	6,733	22,442
Norwalk Power LLC, 2	8,557	4,278	2,567	2,567	0	100%	2,567	8,557
PSEG Power Connecticut LLC, Bridgeport Unit 3	18,212	9,877	5,926	5,926	5,926	67%	2,694	2,964
PSEG Power Connecticut LLC, New Haven Unit 1	20,508	10,282	6,169	6,169	6,169	70%	6,169	20,508
BART Only Total	88,037	53,313	32,253	32,253	29,686	66%		

Alternative BART Total	150,548.4	89,307.7	60,358.7	56,930.2	49,124.7	67%	

Comment:

"As Figures 1.3 and 3.1 appear identical, consider removing 3.1 and referencing Figure 1.3 in Section 3."

Response:

DEEP agrees and has made the change.

Comment:

"Page 39, first line, consider rephrasing to state: "The control strategies of the regional haze SIP, describe in Sections 2 and 3, are intended to reduce the emissions of haze causing pollutants."

Response:

DEEP agrees and has made the change.

Comment:

"Dolly Sods and Shenandoah are included in table 5.2, Figures 5.1, 5.4 and 5.5; consider adding Dolly Sods and Shenandoah to table 5.1 for consistency."

Response:

DEEP agrees with the addition for consistency. The table was amended as below.

	Class I Area	Baseline Visibility (2000-2004)	Reasonable Progress Goal Visibility (2018)	Natural Visibility Conditions
20% Haziest Days	Acadia National Park (ME)	22.9	19.4	12.4
	Brigantine Wilderness (NJ)	29.0	25.1	12.2
	Great Gulf Wilderness & Presidential Range-Dry River Wilderness (NH)	22.8	19.1	12.0
	Lye Brook Wilderness (VT)	24.4	20.9	11.7
	Moosehorn Wilderness and Roosevelt Campobello International Park (ME)	21.7	19.0	12.0
	Dolly Sods Wilderness (WV)	29.5	21.7	10.4
	Shenandoah National Park (VA)	29.3	21.9	11.4
20% Clearest Days	Acadia National Park (ME)	8.8	8.3	4.7
	Brigantine Wilderness (NJ)	14.3	14.3	5.5
	Great Gulf Wilderness & Presidential Range-Dry River Wilderness (NH)	7.7	7.2	3.7
	Lye Brook Wilderness (VT)	6.4	5.5	2.8
	Moosehorn Wilderness and Roosevelt Campobello International Park (ME)	9.2	8.6	5.0
	Dolly Sods Wilderness (WV)	12.3	11.1	3.6
	Shenandoah National Park (VA)	10.9	8.7	3.1

Comment:

"Figures 5.4 and 5.5: Consider moving the placement of Acadia to first column for easier comparison, as Acadia is first in other tables and figures. It appears that Figures 5.4 and 5.5 columns were placed in order from highest to lowest light extinction values 2000-2004, but we would suggest staying with the order used in other Section 5 Tables and Figures (Acadia, Brigantine, Great Gulf, etc.) for consistency.

Response:

DEEP has made the adjustment.

U.S. Environmental Protection Agency:

Comment:

> *"1.1 Purpose. In discussing the requirements for the 5-Year Progress Report, CT DEEP includes the provisions from 40 CFR section 51.308 and section 51.309. Connecticut, however, is only subject to 40 CFR 51.308. Therefore, CT DEEP should remove the references to 51.309. "*

Response:

DEEP has removed the 51.309 references.

Comment:

> *"1.5 Summary of Connecticut's Regional Haze SIP Submittal- The development of the BART equivalency demonstration does not need to be revisited in the 5-Year Progress Report. CT DEEP committed to implement the alternative to BART strategy outlined in the state's Regional Haze SIP and EPA approved that SIP. The status of implementing those control measures and the reductions they achieved by the alternative BART strategy should be assessed in the report."*

Response:

DEEP agrees and has removed the redundant information, as it is not the purpose of this report.

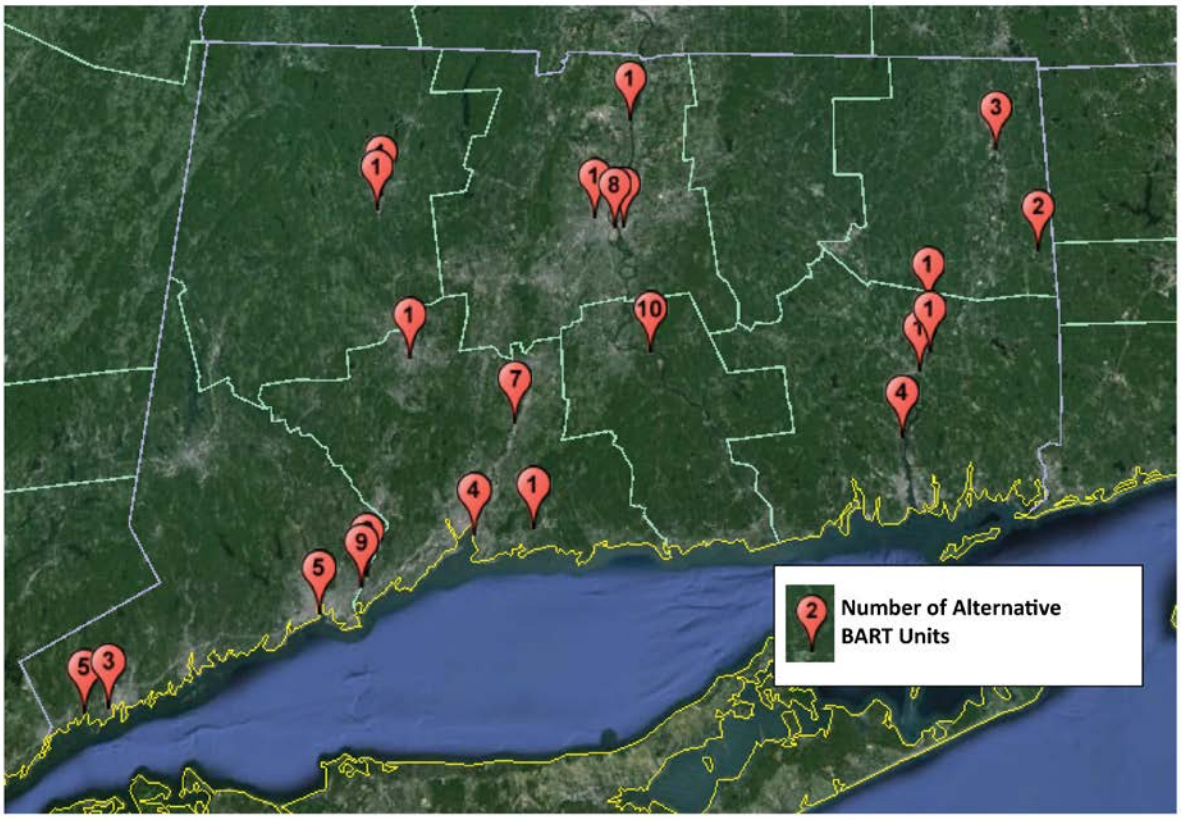
Comment:

> *"2.1 Demonstration of BART Equivalency- As noted above, it is not necessary to revisit the equivalency of the alternative to BART strategy to BART. The focus of the progress report is to examine how the measures that were actually implemented compare to the planned alternative BART strategy laid out in the approved Regional Haze SIP.*
>
> *Also, it would be helpful to include a graphic showing the locations of all the units subject to the alternative BART strategy."*

Response:

DEEP agrees and has removed the redundant material and refocused the section as a summary of the approved alternative BART program. Graphic suggested was included.

Connecticut Alterantive BART Unit Locations



Comment

" 2.1.1 Status of DEEP's SO2 BART Equivalency- EPA's "General Principles for the 5-Year Regional Haze Reports for the Initial Regional Haze State Implementation Plans (Intended to Assist States and EPA Regional Offices in Development and Review of the Progress Reports)" issued April 2013 states: " Because reductions in SO2 and NOX emissions from EGUs are generally critical elements of each states regional haze strategy, the 5-year progress reports should identify sources reporting to EPA's Clean Air Markets Division (AMD) and discuss trends for the state using the latest information available from CAMD "Clean Air Markets Data and Maps website: http://ampd.epa.gov/". Therefore, CTDEEP should use 2014 data when discussing current emissions rather than 2011 as is stated in draft report."

Response:

DEEP agrees that the most recent data set should be included in the trends analysis. DEEP is including the 2014 reported emissions. DEEP also feels that maintaining a comparable data set is important. Therefore, we are including the 2014 emissions for all sources and maintaining the 2011 emissions reported so the reader can compare the emissions to the most recent NEI, of 2011.

Comment:

"Table 2.1 SO2 Potential Emissions of BART-Eligible Units- CT DEEP should include a table showing the following for each unit included in the Connecticut's Alternative to BART strategy: The actual 2002 base year emissions; the most recent annual emissions; and the percent reduction. A similar table should be included for NOx Emissions. "

Response:

DEEP agrees. The size of the applicability of the alternative BART program is not conducive for a table within the main document. Rather, Appendix C is to serve as the full table. DEEP has added the most recent emissions and percent reduced to Appendix C and summarized the information two graphics with in the main document (Figures 2.2 and 2.3).

Comment:

"2.1.2 Status of DEEPs NOX BART Equivalency- With the reinstatement of the Cross State Air Pollution Rule (CSAPR), CT DEEP should mention that the state plans to take steps in order to preserve the ozone season NOX reductions achieved through the former Clean Air Interstate Rule (CAIR)."

Response:

DEEP has amended the sentence below to include the suggestion:

RCSA section 22a-174-22c implemented the federal Clean Air Interstate Rule (CAIR) trading program. DEEP is currently evaluating an alternative approach to preserve the NOx reductions achieved through CAIR.

Comment:

"Figure 2.2 BART facility Particulate Emissions- Footnote 11 – Footnote 11 details PM2.5 emissions reductions at Norwalk Unit 1 in comparison to Unit 2. However, it should be noted that the facility has shut down. "

Response:

DEEP agrees and has made the footnote amendment and updated to reflect version 2 of 2011 NEI.

Comment:

"2.3 Evaluation and implementation of Other Control Methods to Reduce SO2 and NOx from coal plants by 2018.- Although it is not necessary to include in a discussion of other control methods for coal fired power plants in the 5-year progress report, if CT DEEP does include such a discussion, we recommend CT DEEP also highlight that the coal plant in Connecticut, Bridgeport Harbor, is subject to Connecticut's Alternative BART Strategy."

Response:

DEEP has added the text below:

As there is only one coal fired boiler in Connecticut, PSEG Bridgeport Harbor 3, the options for additional reductions in SO_2 and NO_x are limited for coal EGUs. This unit is already included in the alternative BART program and therefore has made significant reductions in its emissions, as noted above. In addition in 2013, the generation produced by PSEG Bridgeport Harbor 3, in Connecticut was down 72 % from 2009, when Connecticut first committed to consider other controls for coal plants (see Figure 2.3). PSEG Bridgeport Harbor 3 mainly operates to meet peak demand or provide power when natural gas supply is curtailed. In addition, the NOx emissions rate of the PSEG Bridgeport Harbor 3 unit is among the lowest for coal units in the country, with an average rate of 0.13 lbs/BTU.[13] However, Connecticut DEEP is evaluating options for additional emissions reductions in NOx from coal EGUs as a part of the 2008 Ozone NAAQS RACT commitment.

Comment:

"3.3 Federal Control Strategies- This section should be updated to indicate that EPA's "Standards of Performance for New Residential Wood Heaters and New Residential Hydronic Heater and Forced-Air Furnaces", was published in the federal register on March 16, 2015."

Response:

DEEP agrees with the update and has added the language below.

3.3. Federal Control Strategies

In addition to Connecticut's and MANE-VU's efforts, EPA has since promulgated federal rules that upon implementation will impact the regional haze progress. CAIR and CAIR's replacement CSAPR are the federal rules with the greatest significance to the regional haze program.

On May 12, 2005, the EPA promulgated the CAIR, which required reductions in emissions of NOx and SO2 from large fossil fuel fired EGUs. Expected emission reductions were included as part of the MANE-VU 2018 modeling effort. The U.S. Court of Appeals for the D.C. Circuit ruled on petitions for review of CAIR and CAIR Federal Implementation Plans, including their provisions establishing the CAIR NOx annual and ozone season and SO2 trading programs. On July 11, 2008, the Court issued an opinion vacating and remanding these rules. However, parties to the litigation requested rehearing of aspects of the Court's decision. The resulting December 23, 2008 ruling left CAIR in place until EPA issued a new rule to replace CAIR in accordance with the July 11, 2008 decision.

On July 6, 2011, EPA finalized the CSAPR. EPA intended for this rule to replace CAIR beginning 2012. CSAPR was estimated to reduce EGU emissions in 28 states from 2005 levels by 6,500,000 tons of SO_2 annually and 1,400,000 tons of NO_x annually. These estimates represented a 71 % reduction in SO_2 and a 52 percent reduction in NO_x from 2005 levels.

On December 30, 2011, the U.S. Court of Appeals for the D.C. Circuit issued a ruling to stay CSAPR pending judicial review. On August 17, 2012, the D.C. Circuit Court of Appeals vacated CSAPR. On October 5, 2012, EPA requested a rehearing *en banc* of the CSAPR vacatur. The court denied this request

on January 24, 2013. The Supreme Court reversed the decision of the D.C. Circuit and sent the case back to the court to resolve the outstanding substantive issues. In response on June 26, 2014, EPA filed a motion requesting that the court lift the stay on CSAPR.

On October, 23, 2014, the U.S Court of Appeals granted EPA's motion and the stay on CSAPR was lifted. CSAPR is scheduled to be effective January 1, 2015. EPA issued a ministerial rule to align the CSAPR dates as ordered by the court (November 21, 2014).

Additionally, EPA has finalized new source performance standards (NSPS) for residential wood heaters and new residential hydronic heaters and forced air furnaces. These new standards will complete the "MANE-VU" ask list. The rule is effective May 15, 2015. [1]

EPA has also implemented three on-road and off-road mobile programs that have and will continue to reduce haze causing emissions. One of EPA's on-road programs that has and will result in significant emissions reductions is the "Tier 2 Vehicle and Gasoline Sulfur Program." [24,25] The EPA's Tier 2 fleet averaging program for on-road vehicles, modeled after the California LEV II standards, became effective in the 2005 model year. The Tier 2 program allows manufacturers to produce vehicles with a range of emissions levels as long as the mix of vehicles that a manufacturer sells each year has average NO_X emissions below a specified value. Mobile emissions continue to benefit from this program as motorists replace older, more polluting vehicles with cleaner vehicles.

Comment:

> *"3.4 Assessment of Implementation Strategies Outside of Connecticut- CT DEEP should confirm that the Long Term Strategy in the existing Connecticut Regional Haze SIP is sufficient to meet the State's emissions reduction obligations. These reductions will help the surrounding Class I areas meet the reasonable progress goals for each area"*

Response:

DEEP has made the below language change:

40 CFR section 51.308(g)(6) of the RHR requires an assessment of whether the current implementation plan elements and strategies are sufficient to enable the State, or other States with mandatory Federal Class I areas affected by emissions from the State, to meet all established RPGs.

Based on the information summarized in this report, DEEP determines that the existing Regional Haze SIP is sufficient to meet our RPGs. Connecticut is on track for meeting the long term goals laid out in the Regional Haze SIP, as all of the strategies committed to have been implemented and emissions reductions have exceeded expectations (see Section 4). All of the Class I areas in the region have already met the said 2018 goals (see Section 5).

[1] 80 FR 13671