NEW YORK STATE | Department of Environmental Conservation

NEW YORK STATE IMPLEMENTATION PLAN FOR THE 2015 OZONE NATIONAL AMBIENT AIR QUALITY STANDARDS

NEW YORK-N. NEW JERSEY-LONG ISLAND, NY-NJ-CT MODERATE NONATTAINMENT AREA

Elements Addressed:

Emissions Inventories (Clean Air Act Section 182(a)(1))
Reasonable Further Progress (RFP) (Clean Air Act Sections 172(c)(2) & 182(b)(1))
Contingency Measures for Failure to meet RFP (Volatile Organic Compounds and Oxides of Nitrogen)
Nonattainment New Source Review
Inspection/Maintenance (Basic)

July 2024
Proposed Revision

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Executive Summary

The United States Environmental Protection Agency (EPA) revised the primary and secondary National Ambient Air Quality Standards (NAAQS) for ozone to 0.070 parts per million (ppm) on October 1, 2015. EPA designated the New York-Northern New Jersey-Long Island, NY-NJ-CT metropolitan area (New York metropolitan area, or NYMA) as a nonattainment area for the 2015 ozone NAAQS with a "moderate" classification on June 4, 2018 (83 Federal Register (FR) 25776).

New York currently has some of the most stringent control programs for ozone precursors, nitrogen oxides (NO_X) and volatile organic compounds (VOCs), in the country. These control programs include:

- Reasonably Available Control Technology (RACT) standards on all major NO_X and VOC stationary sources including electric generating units (EGUs) and non-EGUs,
- Certain California motor vehicle emission standards that more stringently regulate the amount of NO_X emitted from motor vehicles than federal emission standards,
- Statewide vehicle inspection and maintenance requirements that include testing of older, high-emitting vehicles to significantly reduce on-road mobile emissions,
- Measures to reduce VOC emissions from a variety of large source categories that have been recommended by the Ozone Transport Commission (OTC) including consumer products, architectural and industrial maintenance coatings, portable fuel containers, adhesives and sealants, asphalt paving, and solvent metal cleaning processes,
- Lowest Achievable Emission Rate (LAER) standards on all new sources in the NYMA that have the potential to emit 25 tons per year (tpy) or more of NO_X or VOCs, and on all existing minor sources that would undergo modifications with emissions above these thresholds; and,
- 6 NYCRR (New York Codes, Rules, and Regulations) Subpart 227-3, a recently adopted control measure that will reduce NO_X emissions from "peaking" turbines -- old, inefficient units that operate only on the hottest summer days when electricity demand is at its highest.

The Clean Air Act (CAA) requires states to develop a general plan to attain and maintain the standards in all areas of the country and a specific plan to attain the standards for each area that is designated nonattainment. These plans, known as State Implementation Plans or SIPs, are developed by state and local air quality management agencies and submitted to EPA for approval.

The following five required elements for the “moderate” classification for the 2015 ozone NAAQS for NYMA are addressed in this State Implementation Plan (SIP) revision for New York:

- Emissions Inventories (Clean Air Act Section 182(a)(1)): This SIP revision contains a “base-year” emissions inventory for the year 2017 for the NYMA “moderate” ozone nonattainment area pursuant to CAA sections 172(c)(3) and 182(a)(1) and (b). This SIP revision also includes a “projection” emissions inventory for the year 2023,
- Reasonable Further Progress (RFP) (Clean Air Act Sections 172(c)(2) & 182(b)(1)): This SIP revision contains a demonstration showing that the 15 percent emission reduction requirement from the 2017 base year emissions inventory through the 2023 projection year emissions inventory has been met through a combination of NO_X and VOC emission reductions,
- Contingency Measures for Failure to meet RFP (Volatile Organic Compounds and Oxides of Nitrogen): This SIP revision contains a discussion of the contingency measure requirements, but since New York did not fail to meet the RFP requirements through 2023, contingency measures for the “moderate” classification for the 2015 ozone NAAQS are no longer applicable,
- Nonattainment New Source Review: The Nonattainment New Source Review requirement is satisfied by 6 NYCRR Part 231, “New Source Review for New and Modified Facilities” currently approved into the New York SIP,
- Inspection/ Maintenance (Basic): Pursuant to CAA section 182(b)(4), the vehicle inspection and maintenance requirement is satisfied by various subparts of 6 NYCRR Part 217, “Motor Vehicle Emissions” that are currently approved in the New York SIP. This SIP revision contains an updated Performance Standard Modeling (PSM) analysis that used the Motor Vehicle Emissions Simulator (MOVES) model; and demonstrates that the current New York I/M program continues to satisfy the CAA requirements.

Table of Contents

List of Tables

List of Figures

List of Appendices

Acronyms and Abbreviations

AFS	Air Facility System
AIM	Architectural and Industrial Maintenance
AIS	Automatic Identification System
ASC	Area Source Classification
AVFT	Alternative Vehicle and Fuel Technology
CAA	Clean Air Act
CEM	Continuous Emission Monitoring
CFR	Code of Federal Regulations
CMV	Commercial Marine Vessels
DV	Design Value
EGU	Electric Generating Unit
EIA	Energy Information Administration
EPA	United States Environmental Protection Agency
ERC	Emission Reduction Credit
ERTAC	Eastern Regional Technical Advisory Committee
FAA	Federal Aviation Administration
GSE	Ground Support Equipment
HAP	Hazardous Air Pollutant
I/M	Inspection and Maintenance
ITN	Itinerant
LTO	Landing and Take-Off
MARAMA	Mid-Atlantic Regional Air Management Association
MOVES	Motor Vehicle Emissions Simulator
MPO	Metropolitan Planning Organization
MVEB	Motor Vehicle Emission Budget
NAAQS	National Ambient Air Quality Standard
NEI	National Emissions Inventory
NEMO	Nonpoint Emissions Methodology and Operator
NNSR	Nonattainment New Source Review
NO	Nitric Oxide
NO_2	Nitrogen Dioxide
NO_X	Oxides of Nitrogen
NOMAD	Nonpoint Methods Advisory
NSR	New Source Review
NWS	National Weather Service
NYCRR	New York Codes, Rules, and Regulations
NYMA	New York Metropolitan Area
NYSDEC	New York State Department of Environmental Conservation
OSD	Ozone Season Day
OTR	Ozone Transport Region
PM	Particulate Matter
$PM_{2.5}$	Particulate Matter (Fine)
PM_{10}	Particulate Matter (Coarse)

ppm	Parts per Million
PSD	Prevention of Significant Deterioration
PSM	Performance Standards Modeling
RACT	Reasonably Available Control Technology
RE	Rule Effectiveness
RFG	Reformulated Gasoline
RFP	Reasonable Further Progress
RVP	Reid Vapor Pressure
SCC	Source Classification Code
SIP	State Implementation Plan
SO_2	Sulfur Dioxide
TIP	Transportation Implementation Plan
TPD	Tons Per Day
VMT	Vehicle Miles Traveled
VOC	Volatile Organic Compound
VPOP	Vehicle Population

Background and Overview of Federal Requirements

Introduction

The CAA requires EPA to establish NAAQS to protect public health and the environment. The CAA allows EPA to establish two types of NAAQS for six criteria air pollutants: primary standards set limits to protect public health, including the health of "sensitive" populations such as people with asthma, children, and the elderly. Secondary standards set limits to protect public welfare, including protection against decreased visibility and damage to animals, crops, vegetation, and buildings.

The EPA Administrator is tasked with considering the available scientific evidence and associated quantitative analyses in setting a primary standard that is requisite (i.e., neither more nor less stringent than necessary) to protect public health with an adequate margin of safety. The Administrator also considers the full body of evidence on welfare effects and related analyses (including the evidence of effects associated with cumulative seasonal exposures of the magnitudes allowed by the current standard) in determining a secondary standard that provides the requisite protection of public welfare from known or anticipated adverse effects.

Ozone Formation

Ozone is produced through complex chemical reactions in which its precursors – primarily NO_X and VOCs – react in the presence of sunlight and high temperatures. Ozone that is found high in the earth's upper atmosphere (stratosphere) is beneficial because it inhibits the penetration of the sun’s harmful ultraviolet rays to the ground. Ozone, however, can also form near the earth's surface (troposphere). This ozone, commonly referred to as ground-level ozone, is breathed in by or comes into contact with people, animals, crops and other vegetation, and can cause a variety of serious health effects and damage to the environment. Stratospheric ozone can occasionally mix down and contribute to ozone levels in the troposphere.

The chemical reactions that create ozone can take place while the pollutants are being blown through the air (or “transported”) by the wind. This means that elevated levels of ozone can occur many miles away from the source of their original precursor emissions. Therefore, unlike more traditional pollutants (e.g., sulfur dioxide (SO_2) and lead (Pb), which are emitted directly and can be controlled at their source), reducing ozone concentrations poses additional challenges.

Ozone Precursor: Oxides of Nitrogen

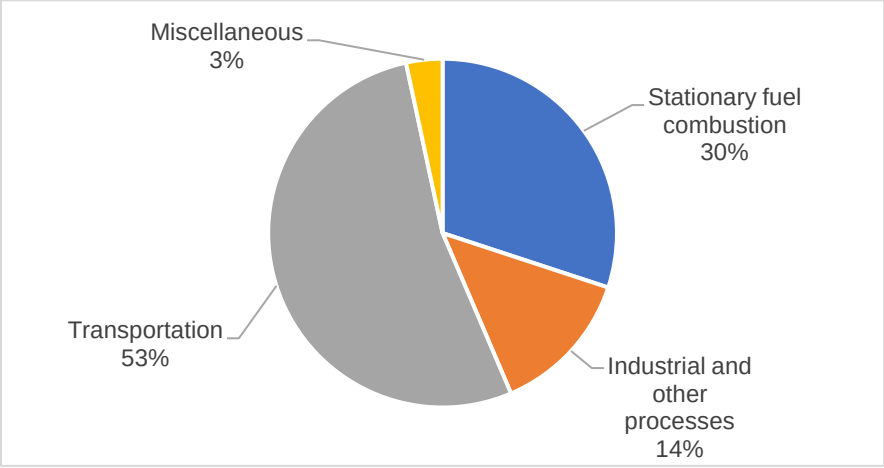
NO_X is a group of gases including nitric oxide (NO) and nitrogen dioxide (NO_2). NO_2 is a reddish-brown, highly reactive gas that is formed in the air through the oxidation of NO. When NO_2 reacts with other chemicals in the atmosphere, it contributes to the formation of ozone and may also form particulate matter (PM), haze, and acid rain. Sources of NO and NO_2 include motor vehicle exhaust (including both gasoline- and diesel-fueled vehicles), the burning of coal, oil, and natural gas, and industrial processes such as welding and electroplating.

Although most NO_X is emitted as NO, it is readily converted to NO_2 in the atmosphere. Since a considerable portion of the NO_X in the air is attributed to motor vehicles, concentrations tend to peak during the morning and afternoon rush hours.

A challenging aspect of controlling ozone pollution in the NYMA is the nonlinear response of ozone to precursor concentrations. Local ozone concentrations may be suppressed by excess NO_X emissions in a process referred to as NO_X titration. Controlling excess NO_X emissions can reduce this suppressive effect and increase ozone concentrations locally until additional reductions result in NO_X becoming the limiting precursor.

Figure 1 shows the national breakdown of NO_X emissions in 2021 by category. In this chart, fuel combustion refers to stationary sources (i.e., from electric utility, industrial, and other sources). Transportation is considered a mainly localized contributor of NO_X, while fossil fuel combustion and industrial sources have transport impacts, making them more of a regional issue. Figure 2 shows these data for New York State.[1]

Figure 1. National Anthropogenic NO_X Emissions by Source Category for 2021



[1] U.S. EPA; Air Pollutant Emissions Trends Data. https://www.epa.gov/air-emissions-inventories/air-pollutant-emissions-trends-data. Accessed June 3, 2022.

Figure 2. New York State Anthropogenic NO_X Emissions by Source Category for 2021

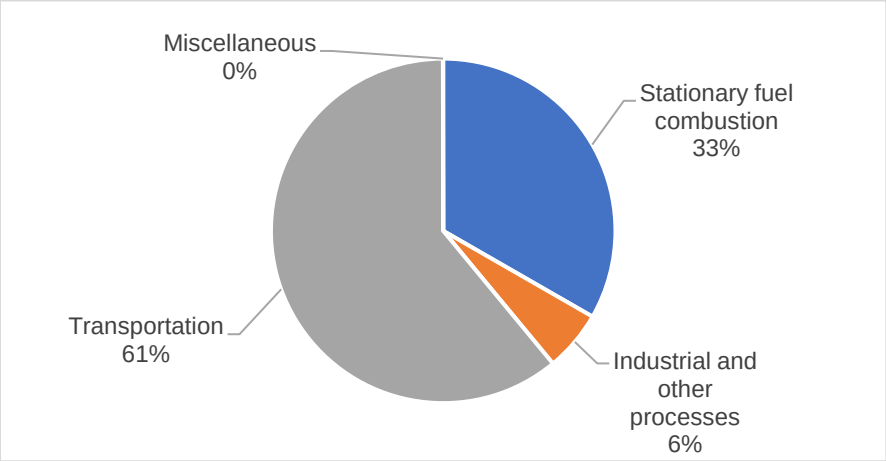
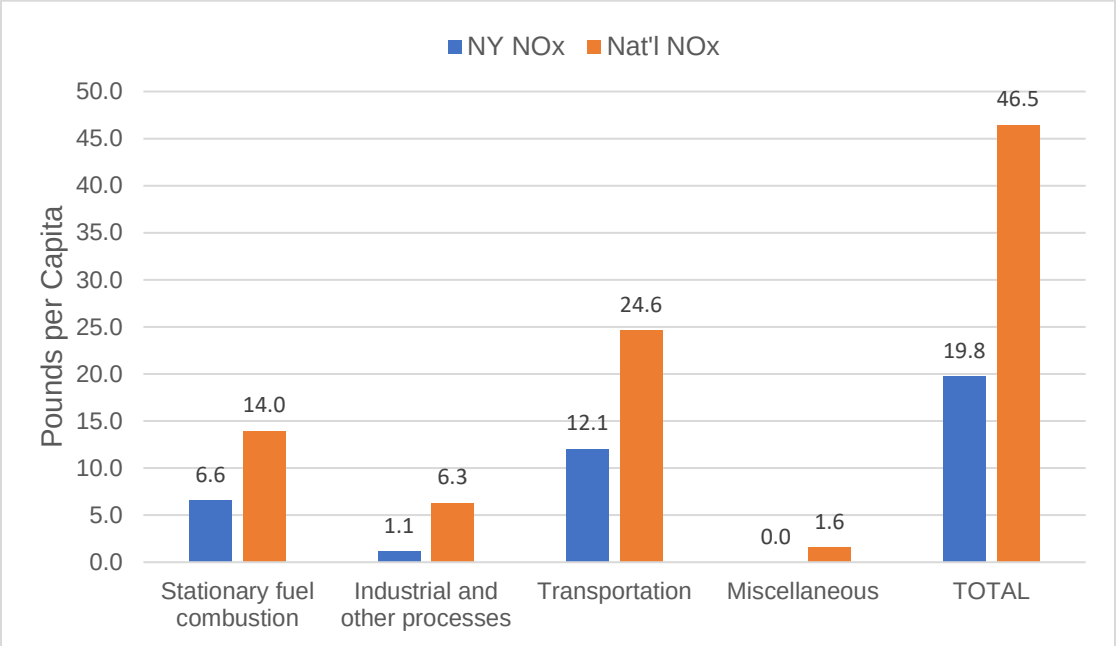


Figure 3 shows 2021 per-capita NO_X emissions at the New York State and national levels for the same categories as in Figure 1 and Figure 2.[2] For each category, emission rates per-capita in New York State are well below national emission rates.

Figure 3. New York State and National NO_X Emissions per Capita for 2021



[2] Ibid.; Population data via U.S. Census Bureau. https://www.census.gov/newsroom/press-releases/2019/popest-nation.html. Accessed June 3, 2022.

Ozone Precursor: Volatile Organic Compounds

VOCs are chemicals that evaporate when they are exposed to air. They are referred to as “organic” because they contain carbon. Some VOC compounds are highly reactive with a short atmospheric lifespan, while others can have a very long lifespan. The short-lived compounds contribute substantially to atmospheric photochemical reactions and thus the formation of ozone.

VOCs are used in the manufacture of, or are present in, many products used daily in both homes and businesses. Some products, like gasoline, actually are VOCs. VOCs are used as fuels (gasoline and heating oil) and are components of many common household items (polishes, cosmetics, perfumes, and cleansers). They are also used in industry as degreasers and solvents, and in dry cleaning. VOCs are present in many fabrics and furnishings, construction materials, adhesives, and paints. Examples of more well-known VOC species include carbon tetrachloride, benzene, and toluene. Because of their widespread historical use and past lack of stringent disposal requirements, they remain in our air, soil, and water in varying concentrations.

Anthropogenic VOCs are primarily emitted into the air by motor vehicle exhaust, industrial processes, and the evaporation of solvents, oil-based paints, and gasoline from gas pumps. Biogenic VOCs, such as isoprene, are commonly emitted by vegetation.

Figure 4 shows the national breakdown of anthropogenic VOC emissions in 2021 by category. As with the NO_X chart, fuel combustion refers to stationary sources (i.e., from electric utility, industrial, and other sources). Figure 5 shows these data for New York State.[3]

[3] U.S. EPA; Air Pollutant Emissions Trends Data; https://www.epa.gov/air-emissions-inventories/air-pollutant-emissions-trends-data. Accessed January 6, 2020.

Figure 4. National Anthropogenic VOC Emissions by Source Category for 2021

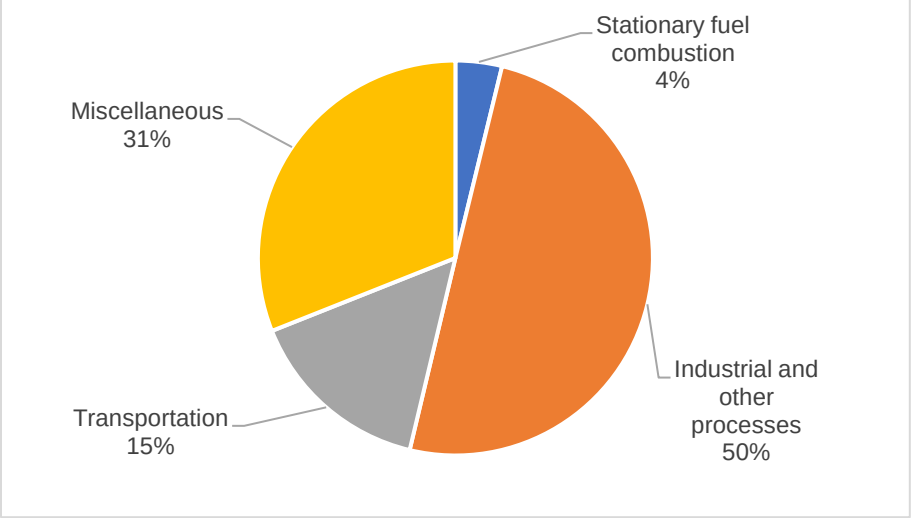


Figure 5. New York State Anthropogenic VOC Emissions by Source Category for 2021

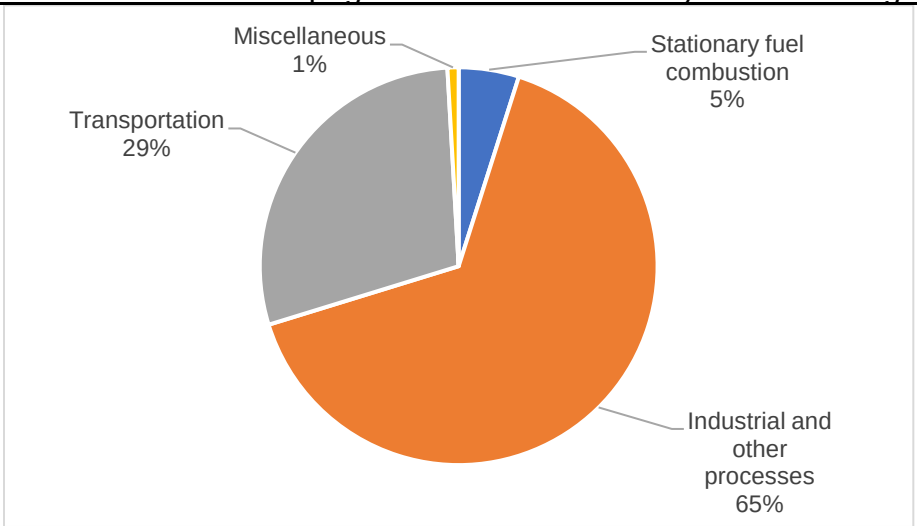
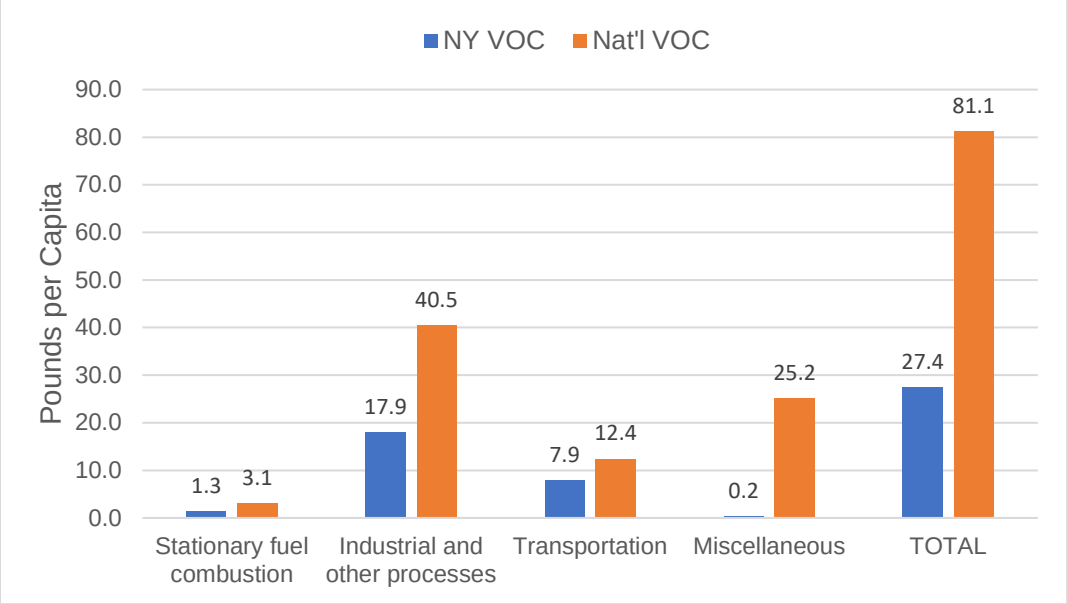


Figure 6 shows 2021 per-capita VOC emissions at the New York State and national levels for the same source categories as in Figure 4 and Figure 5.[4] For each source category, emissions rates per-capita in New York State are well below the national emission rates.

[4] Ibid.; Population data via U.S. Census Bureau. https://www.census.gov/newsroom/press-releases/2019/popest-nation.html. Accessed January 6, 2020.

Figure 6. New York State and National VOC Emissions per Capita for 2021



Health and Welfare Effects

Ground-level ozone can irritate lung airways and cause skin inflammation like a sunburn. Other symptoms from ground-level ozone exposure include wheezing, coughing, pain when taking a deep breath, and breathing difficulties during exercise or outdoor activities. Even at very low levels, exposure to ground-level ozone can result in decreased lung function, primarily in children active outdoors, as well as increased hospital admissions and emergency room visits for respiratory illnesses among children and adults with pre-existing respiratory diseases (e.g., asthma). People with respiratory problems are most vulnerable to the health effects associated with ozone exposure, but even healthy people that are active outdoors can be affected when ozone levels are high.

In addition to its health effects, ozone interferes with the ability of plants to produce and store nutrients, which makes them more susceptible to disease, insects, harsh weather, and other pollutants. This impacts annual crop production throughout the United States, resulting in significant losses and injury to native vegetation and ecosystems. In addition, ozone damages the leaves of trees and other plants, ruining the appearance of cities, national parks, and recreation areas. Ozone can also damage certain man-made materials, such as textile fibers, dyes, rubber products, and paints.

Clean Air Act Amendments of 1990

The U.S. Congress approved changes to the federal CAA in 1990 by adding provisions that addressed acid rain, hazardous air pollutants (HAPs), and stratospheric ozone, and significantly changed the way in which states were to address remaining attainment problems for criteria pollutants, including ground-level ozone. As opposed to the past when areas were merely designated as attainment, nonattainment, or unclassifiable, the 1990 Amendments required areas to also be classified according to severity. Additional requirements were placed on areas with more severe classifications, and additional time was provided to demonstrate attainment with the NAAQS.

History of the 8-Hour Ozone NAAQS

In an effort to develop an ozone standard that was more protective of public health than the 1-hour standards, EPA promulgated ozone standards of 0.08 parts per million (ppm) measured over an 8-hour period (known as the 8-hour standard or 1997 NAAQS) on July 18, 1997.[5] After a long period of litigation, EPA finalized designations for the 1997 NAAQS on April 30, 2004.[6] A number of areas within New York State were designated nonattainment for the 1997 NAAQS at the time, including the New York-Northern New

[5] "National Ambient Air Quality Standards." Final Rule. Published July 18, 1997; effective September 16, 1997. 62 FR 38856-38896.

[6] "Air Quality Designations and Classifications for the 8-Hour Ozone National Ambient Air Quality Standards; Early Action Compact Areas with Deferred Effective Dates." Final Rule. Published April 30, 2004; effective June 15, 2004. 69 FR 23858-23951.

Jersey-Long Island, NY-NJ-CT area. All nonattainment areas located in New York State now monitor attainment of the 1997 NAAQS. The 1997 NAAQS was revoked by EPA effective April 6, 2015.[7]

In 2008, the primary and secondary ozone NAAQS were revised from 0.08 ppm to 0.075 ppm in response to health and welfare studies conducted at that time.[8] Designations for the 2008 ozone standards became effective on July 20, 2012.[9]

On October 1, 2015, EPA finalized a more stringent ozone NAAQS where the levels of the primary and secondary standards were both lowered to 0.070 ppm. EPA designated areas for the 2015 ozone NAAQS in two separate rulemakings. EPA designated all counties outside of the NYMA as attainment for the 2015 NAAQS that became effective January 16, 2018.[10] EPA designated the New York-Northern New Jersey-Long Island, NY-NJ-CT area as nonattainment, with a "moderate" classification that became effective on August 3, 2018.[11] The New York state portion of this tri-state nonattainment area consists of the counties of Bronx, Kings, Nassau, New York, Queens, Richmond, Rockland, Suffolk, and Westchester; the remainder of the nonattainment area consists of twelve counties in New Jersey and three counties in Connecticut.

Overview of Federal Requirements for the 2015 Ozone NAAQS

EPA's final rule entitled "Implementation of the 2015 National Ambient Air Quality Standards for Ozone: Nonattainment Area State Implementation Plan Requirements for the 2015 Ozone NAAQS" [83 FR 62998, December 6, 2018] addresses a range of nonattainment area and Ozone Transport Region (OTR) SIP requirements, including, but not limited to, requirements for:

- attainment demonstrations,
- milestone compliance demonstrations to address reasonable further progress requirements,
- planning and implementation deadlines for RACT,
- reasonably available control measures (RACM),
- consideration of pollution sources within a state but outside of a nonattainment area for purposes of attainment planning; optional ozone NAAQS trading provisions for pollutants that react to form ozone, which would allow either VOC or NOx emissions reductions to satisfy nonattainment New Source Review permitting emissions,
- offset requirements for VOC or NOx emissions increases,

[7] "Implementation of the 2008 National Ambient Air Quality Standards for Ozone: State Implementation Plan Requirements." Final Rule. Published March 6, 2015; effective April 6, 2015. 80 FR 12264-12319.
[8] "National Ambient Air Quality Standards for Ozone." Final Rule. Published March 27, 2008; effective May 27, 2008.
[9] "Air Quality Designations for the 2008 Ozone National Ambient Air Quality Standards." Final Rule. Published May 21, 2012; effective July 20, 2012. 77 FR 30088-30160.
10 "Air Quality Designations for the 2015 Ozone National Ambient Air Quality Standards (NAAQS)," Final Rule. Published November 16, 2017; effective January 16, 2018. 82 FR 54232.
[11] "Additional Air Quality Designations for the 2015 Ozone National Ambient Air Quality Standards," Final Rule. Published June 4, 2018; effective August 3, 2018. 83 FR 25776.

- the timing of required SIP submissions, and compliance with emission control measures in the SIP; and,
- emissions inventories and emissions statements.

This SIP revision addresses five required elements:

- Emissions Inventories (Clean Air Act Section 182(a)(1))
- Reasonable Further Progress (RFP) (Clean Air Act Sections 172(c)(2) & 182(b)(1))
- Contingency Measures for Failure to meet RFP (Volatile Organic Compounds and Oxides of Nitrogen)
- Nonattainment New Source Review
- Inspection/Maintenance (Basic)

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Section 1: Emissions Inventories (Clean Air Act Section 182(a)(1))

NYSDEC developed six emissions inventories that are included as part of this SIP revision:

- 2017 Statewide Annual Emissions
- 2017 NYMA Annual Emissions
- 2017 Statewide Ozone Season Day Emissions
- 2017 NYMA Ozone Season Day Emissions
- 2023 Statewide Ozone Season Day Emissions
- 2023 NYMA Ozone Season Day Emissions

There are five source categories in each emission inventory:

- Point
- Nonpoint (often referred to as “area” sources)
- On-road mobile
- Nonroad mobile
- Biogenic

The following pollutants are included in the annual emissions inventories:

- Carbon Monoxide (CO),
- Oxides of Nitrogen (NO_X),
- Volatile Organic Compounds (VOC),
- Coarse particulate matter (PM_{10}),
- Fine particulate matter ($PM_{2.5}$),
- Carbon Dioxide (CO_2),
- Sulfur Dioxide (SO_2),
- Ammonia (NH_3),
- Methane (CH_4), and,
- Lead (Pb).

The following pollutants are included in the ozone season day emissions inventories:

- NO_X
- VOCs

2017 Statewide and NYMA Annual Emissions Inventories - Summary

The statewide annual emissions inventory for 2017 is summarized below in Table 1 and the percent share of each source category is summarized below in Table 2. Table 3 summarizes the 2017 annual emissions inventory for the nine-county NYMA and the percent share of each source category is summarized below in Table 4.

Complete 2017 "by-county" and "statewide" emissions inventories for CO, NO_X, VOCs, PM_{10}, $PM_{2.5}$, CH_4, SO_2, NH_3, CO_2, and Pb are included in this SIP revision in Appendix A. Facility-specific point source emissions inventories for 2017 can be found in Appendix B. Point source emissions inventories for both EGUs and non-EGUs are presented with and without rule effectiveness (RE).

Table 1. 2017 Statewide Annual Emissions Inventory by Source Category

2017 Statewide Annual Emissions Inventory by Source Category							
	Point (tons)	Point with RE (tons)	Nonpoint (tons)	Nonroad (tons)	On-Road (tons)	Biogenic (tons)	Total* (tons)
CO	30,958	31,055	159,577	586,561	488,844	52,598	1,318,538
NO_X	27,824	33,258	53,394	66,439	93,641	11,441	252,739
VOC	6,940	16,016	163,844	53,951	39,030	325,537	589,303
PM_{10}	3,198	14,586	108,654	4,715	81,751	-	198,318
$PM_{2.5}$	2,428	9,745	42,301	4,451	14,104	-	63,284
CO_2	37,472,846	37,472,848	162,748	11,104,587	70,466,067	-	119,206,248
SO_2	17,604	18,452	5,609	961	959	-	25,133
NH_3	890	891	38,798	89	3,733	-	43,510
CH_4	43,927	46,990	628	3,490	4,369	-	52,415
Pb	1	1	1,291	7	-	-	1,299

*Point source emissions inventories with RE not included in the total for all categories

Table 2. 2017 Statewide Annual Emissions Inventory Contributions by Source Category

2017 Statewide Annual Emissions Inventory Contributions by Source Category						
	Point	Nonpoint	Nonroad	On-Road	Biogenic	Total*
CO	2.35%	12.10%	44.49%	37.07%	3.99%	100.00%
NO_X	11.01%	21.13%	26.29%	37.05%	4.53%	100.00%
VOC	1.18%	27.80%	9.16%	6.62%	55.24%	100.00%
PM_{10}	1.61%	54.79%	2.38%	41.22%	0.00%	100.00%
$PM_{2.5}$	3.84%	66.84%	7.03%	22.29%	0.00%	100.00%
CO_2	31.44%	0.14%	9.32%	59.11%	0.00%	100.00%
SO_2	70.04%	22.32%	3.82%	3.81%	0.00%	100.00%
NH_3	2.05%	89.17%	0.20%	8.58%	0.00%	100.00%
CH_4	83.81%	1.20%	6.66%	8.34%	0.00%	100.00%
Pb	0.09%	99.39%	0.51%	0.00%	0.00%	100.00%

*Point source emissions with RE not included in the total for all categories

Table 3. 2017 NYMA Annual Emissions Inventory by Source Category

2017 NYMA Annual Emissions Inventory by Source Category							
	Point (tons)	Point with RE (tons)	Nonpoint (tons)	Nonroad (tons)	On-Road (tons)	Biogenic (tons)	Total* (tons)
CO	5,785	5,870	37,745	325,153	214,572	3,398	586,653
NO_X	11,633	11,656	31,350	33,613	38,504	368	115,468
VOC	1,447	8,054	78,139	21,000	17,093	24,632	142,311
PM_{10}	333	519	34,200	2,250	13,399	-	50,181
$PM_{2.5}$	802	802	14,221	2,130	3,713	-	20,866
CO_2	18,924,378	18,924,378	15,880	6,310,604	31,633,129	-	56,883,992
SO_2	1,230	1,308	2,679	740	422	-	5,071
NH_3	375	375	1,427	43	1,686	-	3,531
CH_4	4,899	7,955	65	1,747	2,317	-	9,028
Pb	0	0	840	2	-	-	842

*Point source emissions with rule effectiveness not included in the total for all categories

Table 4. 2017 NYMA Annual Emissions Inventory Contributions by Source Category

2017 NYMA Annual Emissions Contributions by Source Category						
	Point	Nonpoint	Nonroad	On-Road	Biogenic	Total*
CO	0.99%	6.43%	55.43%	36.58%	0.58%	100.00%
NO_X	10.07%	27.15%	29.11%	33.35%	0.32%	100.00%
VOC	1.02%	54.91%	14.76%	12.01%	17.31%	100.00%
PM_{10}	0.66%	68.15%	4.48%	26.70%	0.00%	100.00%
$PM_{2.5}$	3.84%	68.15%	10.21%	17.80%	0.00%	100.00%
CO_2	33.27%	0.03%	11.09%	55.61%	0.00%	100.00%
SO_2	24.25%	52.84%	14.59%	8.32%	0.00%	100.00%
NH_3	10.61%	40.41%	1.22%	47.75%	0.00%	100.00%
CH_4	54.26%	0.73%	19.35%	25.66%	0.00%	100.00%
Pb	0.02%	99.75%	0.22%	0.00%	0.00%	100.00%

*Point source emissions with RE not included in the total for all categories

2017 Statewide and NYMA Annual Emissions Inventories - Methodologies

Point Sources Methodology

NYSDEC uses an integrated computer system for emissions, permitting, compliance, and fee billing known as the Air Facility System (AFS). The Emissions Inventory module of AFS is a database that contains detailed facility and emissions information for all major (Title V) sources in New York State. This database is used to generate annual emission statement surveys for major facilities. Facilities are required to report the type and amount of fuel consumed (combustion sources), throughput rates (non-combustion processes), average hours of operation, percent operation by season, control descriptions/efficiencies, and estimates of actual emissions for each regulated contaminant.

The 2017 emissions from point sources used to develop the baseline inventory were obtained directly from emission statement surveys from Title V sources. Emission statements submitted to NYSDEC pursuant to 6 NYCRR Subpart 202-2 are reviewed by staff for accuracy, quality, and completeness. The data from the major sources were subdivided into EGU and non-EGU point source categories for purposes of this SIP revision.

Nonpoint Sources Methodology

Nonpoint sources are defined, and emissions from these sources calculated, in accordance with technical guidance, tools, and methodologies from multiple sources. Most of these sources can be found on EPA's Air Emission Inventory webpage and/or are shared with states through the Nonpoint Methods Advisory (NOMAD) Workgroup and the National Emissions Inventory (NEI) SharePoint sites. Nonpoint sources collectively represent individual stationary sources that have not been inventoried as specific point sources because they are too small, numerous, or difficult to inventory using the methods for the other classes of sources. Nonpoint sources represent a collection of emission points for a specific geographic area, commonly defined at the county level. Facilities and emission points are grouped together with other like sources into nonpoint source categories. Emissions can be estimated for an entire category using one methodology for each Area Source Classification code (ASC). This methodology normally requires point source subtraction, a step which excludes emissions from sources accounted for in the point source inventory. Nonpoint source categories must be defined to avoid overlap or duplication with point, mobile, or biogenic emissions sources.

In addition to using tools and methods provided by EPA, NYSDEC uses other methodologies for calculating specific nonpoint emission sources when state specific activity data is available to improve the accuracy of calculations. Details of other area source methodologies are provided in Appendix L.

On-Road Sources Methodology

NYSDEC developed the 2017 base year on-road mobile source emissions inventory utilizing EPA's Motor Vehicle Emissions Simulator (MOVES) model, MOVES3. The emissions inventory was modeled in accordance with EPA's guidance, *MOVES3 Technical Guidance: Using MOVES to Prepare Emission Inventories for State Implementation Plans and Transportation Conformity*. Ozone season day emissions were calculated by adding emissions during the months of June, July, and August and then dividing by 92 (the number of days in the ozone season).

The on-road inventory includes an estimate of emissions, including refueling emissions, from all motorized vehicles operated on public roadways. Where available, local-level data were used in place of default data to model New York's county-level emissions. The local-level data are provided by several agencies and are derived mainly from vehicle registration data, estimated vehicle miles traveled (VMT), regional fuel characteristics, emission control programs, and meteorological data. The data were processed and formatted into 14 different MOVES3 input files and imported into MOVES3. All inputs rely on the latest New York State specific data available or MOVES3 defaults if state specific data were not available. A detailed description of the methodologies used by NYSDEC for developing MOVES-specific inputs, along with 2017 annual and ozone season day emission estimates, can be found in Appendix H.

Road Dust Methodology – 2017 Base-Year Only

NYSDEC calculated the 2017 road dust emission inventory for both paved and unpaved roads using the 2020 version of EPA's Wagon Wheel Tool. The inventory calculation methodology that the Wagon Wheel Tool uses is described in Appendix J1.

NYSDEC used five datasets in its road dust calculations:

- Road Dust County Control Factor
- Road Dust County Paved and Unpaved Vehicle Miles Traveled
- Road Dust Meteorology Adjustment factor
- Road Dust Surface Material Moisture Content
- Road Dust Surface Material Silt Content

NYSDEC used the 2020 Wagon Wheel defaults for all datasets except for the meteorology factor and the road dust county paved and unpaved vehicle miles traveled. NYSDEC used the default meteorology dataset from the 2017 Wagon Wheel Tool because it corresponds with the 2017 base year emissions inventory.

2017 annual re-entrained emission estimates can be found in Appendix D3.

Nonroad Sources Methodology

The nonroad mobile source emissions inventory includes four sub-categories: nonroad, aircraft, commercial marine vessels, and locomotives. The nonroad sub-category

consists of 12 economic sectors with 88 equipment types.[12] Emissions for the four sub-categories were estimated using different methodologies.

Nonroad Equipment

Nonroad emissions for 2017 were estimated for all 62 New York counties using EPA's MOVES3 nonroad model. Emissions from "Airport Support" were included in the airport inventory and removed from the nonroad inventory to avoid double counting.

Since estimating local data on nonroad equipment populations and activity can be challenging, the MOVES3 nonroad model only requires three data input tables: meteorological, fuel supply, and fuel formulation. The meteorological and fuel formulation data tables are the same as those used for the on-road model, while the fuel supply data table is nonroad specific and includes slightly different fuel IDs when compared to the on-road fuel supply data. Using the MOVES3 nonroad model, nonroad emissions from New York were estimated for each individual county for each month of the year. A description of the three data tables used in the nonroad model follows:

Meteorological Data

Surface meteorological data, including temperature and dew point temperature for 2017, were obtained from the National Climatic Data Center for all available National Weather Service (NWS) offices and reporting stations across the state. Monthly average diurnal temperature and relative humidity were subsequently calculated for each dataset. Meteorological data were then selected for each county based on climatological representativeness and/or location of the available stations. If a county did not have a specific NWS office located in it, data from a nearby office with similar meteorological conditions were used. Based on these considerations, a county assignment table was developed and used to populate the respective "ZoneMonthHour" tables for each county input file.

The relative humidity data were calculated from hourly NWS observations that NYSDEC obtained from the National Climatic Data Center. Dew point observations for the same dates and locations that were used in temperature calculations were also used to determine hourly relative humidity values. The calculation method assumed standard atmospheric pressure to determine saturation vapor pressure from the temperature and vapor pressure from the dewpoint. The vapor pressure divided by the saturation vapor pressure, multiplied by 100, equals relative humidity.

[12] The 12 economic sectors are: agriculture, airport support, commercial, construction, industrial, lawn/garden, logging, oil field, pleasure craft, railroad (railway maintenance equipment), recreational, and underground mining.

Monthly average diurnal humidity was then calculated from the hourly values.

Fuel Supply Data

NYSDEC does not have state specific data for nonroad fuel supply and therefore used the default nonroad data in MOVES3. New York has two fuel regions: upstate and downstate. Downstate counties require reformulated gasoline (RFG) in accordance with CAA Section 211(k)(10)(D), which applies to the NYMA. Because of this, upstate and downstate counties have different fuel formulation IDs for gasohol (E10). Downstate counties include Bronx, Dutchess, Kings, New York, Nassau, Suffolk, Putnam, Richmond, Queens, Orange, Rockland, and Westchester. The remaining 50 counties in New York State are considered upstate. For more information on the RFG requirement, see the Fuel Formulations section below.

Fuel Formulation Data

The Fuel Formulation table defines the properties of each fuel. Some examples of fuel properties are Reid Vapor Pressure (RVP), sulfur level, and ethanol volume. The data table contains defaults from MOVES with updated RVP and Sulfur content based on New York State sampling results. Because downstate counties are within the New York Metropolitan ozone nonattainment area, RFG is required to be sold during the summer months (May-September) in these counties. RFG has slightly lower RVP values, which cause the gasoline to emit less ozone causing pollution. The updated RVP and Sulfur content values are obtained from the Bureau of Mobile Sources and Technology Department within NYSDEC. The Downstate counties include Bronx, Dutchess, Kings, New York, Nassau, Suffolk, Putnam, Richmond, Queens, Orange, Rockland, and Westchester counties. The remaining 50 counties in New York are considered upstate.

Commercial Marine Vessels (CMV)

The CMV source category includes boats and ships used either directly or indirectly in the conduct of commerce or military activity. Most vessels in this category are powered by diesel engines that are fueled with either distillate or residual fuel oil blends. The CMV inventory includes Category 1 (C1), Category 2 (C2), and Category 3 (C3) vessels.

C1 and C2 vessels tend to be smaller ships that operate closer to shore, and along inland and inter-coastal waterways. C1 and C2 marine vessels typically have engines between 700 and 11,000 hp, often using distillate fuels, which provide propulsion power on many kinds of vessels including tugboats, push-boats, supply vessels, fishing vessels, and other commercial vessels in and around ports. C3 marine vessels include ships with engine displacement above 30 liters per cylinder and typically use residual oil.

The CMV source category does not include recreational marine vessels, which are generally less than 100 feet in length (the majority of which are less than 30 feet) and are powered by either inboard or outboard engines. The emissions from recreational marine vessels are accounted for as part of the “other” category of the nonroad inventory developed using the MOVES model.

CMV emissions for New York State for 2017 are based on the 2017 NEI developed by EPA. 2017 NEI CMV estimates no longer use the emissions types (M=maneuvering, H=hoteling, C=cruise, Z=reduced speed zone) used in previous NEIs. New source classification codes (SCC) for CMV are shown in Table 5. Emission factors vary by SCC.

Table 5. New Commercial Marine SCCs and SCC levels in EPA Estimates

SCC	SCC Level Three*	SCC Level Four
2280002101	Diesel	C1C2 Port Emissions: Main Engine
2280002102	Diesel	C1C2 Port Emissions: Auxiliary Engine
2280002201	Diesel	C1C2 Underway Emissions: Main Engine
2280002202	Diesel	C1C2 Underway Emissions: Auxiliary Engine
2280002103	Diesel	C3 Port Emissions: Main Engine
2280002104	Diesel	C3 Port Emissions: Auxiliary Engine
2280002203	Diesel	C3 Underway Emissions: Main Engine
2280002204	Diesel	C3 Underway Emissions: Auxiliary Emissions
2280003103	Residual	C3 Port Emissions: Main Engine
2280003104	Residual	C3 Port Emissions: Auxiliary Engine
2280003203	Residual	C3 Underway Emissions: Main Engine
2280003204	Residual	C3 Underway Emissions: Auxiliary Engine

*SCC Level One: Mobile Sources, SCC Level Two: Marine Vessels, Commercial

Table 6. Retired Commercial Marine SCCs and SCC Levels

SCC	SCC Level One	SCC Level Two	SCC Level Three	SCC Level Four
2280002100	Mobile Sources	Marine Vessels, Commercial	Diesel	Port Emissions
2280002200	Mobile Sources	Marine Vessels, Commercial	Diesel	Underway Emissions
2280003100	Mobile Sources	Marine Vessels, Commercial	Residual	Port Emissions
2280003200	Mobile Sources	Marine Vessels, Commercial	Residual	Underway Emissions

Geographically, the inventories include port and interport emissions that occur within the area that extends 200 nautical miles from the official U.S. shoreline, which is roughly equivalent to the border of the U.S. Exclusive Economic Zone. EPA allocates only some of these emissions to counties based on official state boundaries that typically extend 3 miles offshore.

EPA's CMV estimates used satellite-based automatic identification system (AIS) activity data from the U.S. Coast Guard. The details of these calculations can be found in "Methodology Documentation for EPA's Commercial Marine Emissions Estimates". Annual CMV emissions for New York State for 2023 are based on EPA's 2017 NEI and Mid-Atlantic Regional Air Management Association (MARAMA) growth factors. MARAMA developed 2023 growth factors through a multi-state collaborative.

Resources for 2017 base year methodology for CMVs (available upon request):

- 2017 National Emissions Inventory Technical Support Document, January 2021
- 2017 National Emissions Inventory Data
- MARAMA Growth Rates Data
- Emissions Inventory System Gateway

Locomotives and Rail Yards

The locomotive category includes railroad locomotives powered by diesel-electric engines. A diesel-electric locomotive uses 2-stroke or 4-stroke diesel engines and an alternator or generator to produce the electricity required to power its traction motors. The locomotive source category is further divided into Class I-line haul, Class II/III- line haul, Passenger, Commuter, and Yard.

Table 7 provides the SCCs for these locomotive sub-categories.

Table 7. Locomotive SCCs

SCC	Description
2285002006	Mobile Sources Railroad Equipment Diesel Line Haul Locomotives: Class I Operations
2285002007	Mobile Sources Railroad Equipment Diesel Line Haul Locomotives: Class II / III Operations
2285002008	Mobile Sources Railroad Equipment Diesel Line Haul Locomotives: Passenger Trains (Amtrak)
2285002009	Mobile Sources Railroad Equipment Diesel Line Haul Locomotives: Commuter Lines
2285002010	Railroad Equipment Diesel Yard Locomotives
28500201	Internal Combustion Engines Railroad Equipment Diesel Yard

EPA's 2017 rail emissions were developed by LADCO and the State of Illinois, with support from various other states in a collaborative team called the Eastern Regional Technical Advisory Committee (ERTAC).

Resources for 2017 base year methodology for locomotives and rail yards (available upon request):

- 2017 National Emissions Inventory Technical Support Document, January 2021
- 2017 National Emissions Inventory Data
- MARAMA Growth Rates Data
- Emissions Inventory System Gateway

Airports

The 2017 airport emissions are based on the airport emissions EPA used for the 2017 NEI. The data were obtained from EPA's "2017EPA_Airports" data set from the EPA EIS Gateway. The data are based on EPA estimated emissions related to aircraft activity for all known New York airports, including seaplane ports and heliports. The aircraft category includes all aircraft types used for public, private, and military purposes. This includes commercial aviation, air taxi, general aviation, military aircraft, ground support equipment (GSE), and auxiliary power units. These categories are broken down further into the multiple SCCs listed in Table 8. Emissions from support equipment were not included in the nonroad inventory to avoid double counting. Appendix M contains information on how the airport emission estimates were developed.[13]

[13] See Sections 3.2.1, 3.2.2, and 3.2.3 of Appendix M

Table 8. Airport SCCs and Emission Types

SCC	SCC Description
2265008005	*GSE, Gas Fueled
2270008005	*GSE, Diesel Fueled
2275001000	Military
2275020000	Commercial Aviation
2275050011	General Aviation, Piston Driven
2275050012	General Aviation, Turbine Driven
2275060011	Air Taxi, Piston Driven
2275060012	Air Taxi, Turbine Driven
2275070000	Auxiliary Power Unit

*GSE emissions were not included in the nonroad inventory to avoid double counting of their emissions.

Lead emissions associated with aircraft result from the use of 100 octane low-lead aviation gasoline (also called AvGas). Tetraethyl lead is added to AvGas to increase fuel octane, prevent engine knock, and prevent valve seat recession and subsequent loss of compression for engines without hardened valves. Lead is not added to jet fuel that is used in commercial aircraft, most military aircraft, or other turbine-engine powered aircraft; therefore, there are no lead emissions associated with non-piston engine SCCs.

Biogenic Sources Methodology

Biogenic emissions levels were determined using BEIS4[14] and the updated BELD6 land use data.

[14] https://www.epa.gov/air-emissions-modeling/biogenic-emission-inventory-system-beis

2017 Statewide and NYMA Ozone Season Day Emissions Inventories - Summary

The statewide 2017 OSD emissions inventories are summarized below in Table 9 and the percent share of each source category is summarized below in Table 10. Table 11 summarizes the 2017 OSD emissions inventories for the NYMA and the percent share of each source category is summarized below in

Table 12.

The OSD emissions inventories are reported on a "by-county" basis for the various source categories. The "by-county" 2017 OSD emissions inventories for NO_X and VOCs are summarized in Appendix G. Point source emissions inventories are presented with and without RE.

Table 9. 2017 Statewide OSD Emissions Inventory by Source Category

2017 Statewide OSD Emissions Inventory by Source Category							
	Point (tpd)	Point with RE (tpd)	Nonpoint (tpd)	Nonroad (tpd)	On-Road (tpd)	Biogenic (tpd)	Total* (tpd)
NO_X	237	259	79	231	263	52	862
VOC	29	55	487	215	114	2,221	3,066

*Point source emissions with RE not included in the total for all categories

Table 10. 2017 Statewide OSD Emissions Contributions by Source Category

2017 Statewide OSD Emissions Contributions by Source Category*						
	Point	Nonpoint	Nonroad	On-Road	Biogenic	Total
NO_X	27.45%	9.13%	26.84%	30.52%	6.06%	100.00%
VOC	0.95%	15.89%	7.01%	3.72%	72.44%	100.00%

*Point source emissions with RE not included in the total for all categories

Table 11. 2017 NYMA OSD Emissions Inventory by Source Category

2017 NYMA OSD Emissions Inventory by Source Category							
	Point (tpd)	Point with RE (tpd)	Nonpoint (tpd)	Nonroad (tpd)	On-Road (tpd)	Biogenic (tpd)	Total * (tpd)
NO_X	132	132	45	108	108	2	394
VOC	10	29	235	87	50	174	556

*Point source emissions with RE not included in the total for all categories

Table 12. 2017 NYMA OSD Emissions Contributions

2017 NYMA OSD Emissions Contributions*						
	Point	Nonpoint	Nonroad	On-Road	Biogenic	Total
NO_X	33.37%	11.44%	27.44%	27.34%	0.42%	100.00%
VOC	1.73%	42.17%	15.71%	9.06%	31.33%	100.00%

*Point source emissions with RE not included in the total for all categories

For most source categories, OSD emission inventories are derived from annual inventories by making adjustments that reflect the relative difference of emission patterns during the summer ozone season when compared to cooler months. Some source categories are more or less likely to have emissions during the ozone season; for example, OSD emissions are less likely to include emissions related to space heating and more likely to have emissions related to air conditioning or painting. Many source categories have relatively constant emissions throughout the year (e.g., consumer products such as deodorant or house cleaning products). OSD emission estimates attempt to characterize those seasonal differences by more accurately reflecting emissions that occur during the summer.

Point Source Methodology

Point source category OSD emissions are calculated from the operational information provided in emission statement surveys. This operational information includes the process throughput and a breakdown of operation by season, including the number of days the process was in operation during that season. OSD emissions were calculated for each process at point sources. An OSD weighted daily rate was calculated using the following method:

$$O_3\ weighted\ daily\ rate\ (o3drtw) = \frac{1}{\#\ of\ O_3\ days\ operated \times \left(\frac{Jun - Aug\ \%\ operation}{100}\right)}$$

OSD emissions for each pollutant were then calculated by multiplying reported pounds of emissions by the “o3drtw” for the 2017 ozone season.

Nonpoint Source Methodology

Nonpoint source category OSD emissions were calculated using the following formula:

$$\text{OSD Emissions} = \frac{\text{Annual Emissions * Ozone Season Factor}}{\text{52 * Activity Days per Week}}$$

The ozone season factor and the number of days per week differed for each nonpoint category; for example, the annual emissions for consumer products are divided by the product of 7 days per week times 52 weeks per year because consumer products are generally used uniformly throughout the year. For dry cleaning, the emissions are assumed to be consistent throughout the year, but emissions are assumed to occur five days per week, so annual emissions for this category are divided by 260 (5*52) to estimate OSD emissions. For Architectural and Industrial Maintenance (AIM) coatings, activity is higher during the summer, so an ozone season factor of 1.3 is applied during

the summer based on EPA guidance.[15] Appendix C provides OSD factors and data for activity days per week for each nonpoint SCC.

On-Road Sources Methodology

OSD emissions are generated from the MOVES model using data specific to June, July, and August, emissions for the three months are summed and then divided by 92 (the number of days in the ozone season).

Nonroad Sources Methodology

For most nonroad source categories (i.e., commercial marine vessels (CMV), rail, airports) there is no evidence that supports using any seasonal adjustment factors to calculate daily emissions. Therefore, OSD emissions for these categories were calculated by dividing the annual emissions by 365.

Biogenic Sources Methodology

Ozone season day emissions were estimated by taking the mean daily biogenic emissions during the months of June, July, and August for each county.

[15] STAPPA-ALAPCO-EPA Emission Inventory Improvement Program; Volume III: Chapter 3 – Architectural Surface Coating, page 3-4. November 1995.

2023 Statewide and NYMA 2023 Ozone Season Day Emissions - Summary

County-level 2023 OSD emissions inventories for NO_X and VOCs are included in this SIP revision in Appendix B and C, respectively, for point and nonpoint sources; Appendices D1-E6 contain the county-level 2023 emissions inventories for on-road and nonroad sources.

Statewide OSD emissions projections for 2023 are summarized in Table 13, and the percent share of each source category is summarized in Table 14. NYMA OSD emissions projections for 2023 are summarized in

Table 15, and the percent share of each source category is summarized in Table 16.

Table 13. 2023 Statewide OSD Emissions by Source Category

2023 Statewide OSD Emissions by Source Category							
	Point (tpd)	Point with RE (tpd)	Nonpoint (tpd)	Nonroad (tpd)	On-Road (tpd)	Biogenic (tpd)	Total* (tpd)
NOx	248	270	79	192	153	52	723
VOC	30	56	486	172	90	2,221	2,998

*Point source emissions with rule effectiveness not included in the total for all categories

Table 14. 2023 Statewide OSD Emissions Contributions by Source Category

2023 Statewide OSD Emissions Contributions by Source Category						
	Point	Nonpoint	Nonroad	On-Road	Biogenic	Total*
NOx	34.29%	10.87%	26.51%	21.11%	7.23%	100.00%
VOC	0.99%	16.20%	5.73%	2.99%	74.09%	100.00%

*Point source emissions with rule effectiveness not included in the total for all categories

Table 15. 2023 NYMA OSD Emissions by Source Category

2023 NYMA OSD Emissions by Source Category							
	Point (tpd)	Point with RE (tpd)	Nonpoint (tpd)	Nonroad (tpd)	On-Road (tpd)	Biogenic (tpd)	Total* (tpd)
NOx	137	137	45	91	66	2	341
VOC	10	29	236	78	41	174	539

*Point source emissions with rule effectiveness not included in the total for all categories

Table 16. 2023 NYMA OSD Emissions Contributions by Source Category

2023 NYMA OSD Emissions Contributions by Source Category						
	Point	Nonpoint	Nonroad	On-Road	Biogenic	Total*
NOx	40.24%	13.24%	26.77%	19.27%	0.49%	100.00%
VOC	1.88%	43.83%	14.39%	7.56%	32.34%	100.00%

*Point source emissions with rule effectiveness not included in the total for all categories

2023 Statewide and NYMA Ozone Season Day Emissions - Methodologies

Point Source and Nonpoint Sources Methodology

The 2017 non-EGU point and nonpoint source emissions inventories were projected to 2023 using growth factors developed by MARAMA. The MARAMA methodology and data can be found in Appendix L.

For EGU point sources, MARAMA used the projection tool developed by state, local and tribal air management agencies with guidance from ERTAC. The ERTAC projection tool[16] uses 2016 base year continuous emission monitoring (CEM) data as collected by CAMD, and growth factors from the EIA (Energy Information Administration) Annual Energy Outlook (AEO) 2019 regional hybrid Reference/High Oil and Gas scenarios projection. EGU unit level adjustments were based on input received from states and stakeholders.

On-Road Sources Methodology

VMT, vehicle population (VPOP), road type distribution, age distribution, fuel formulation, and alternative vehicle and fuel technology (AVFT) tables were updated to project the 2017 on-road inventory to 2023.

Several data sources and methods were used to update the 2017 data. VMT was calculated using growth based on linear regression of Highway Performance Monitoring System historical data for forecasting VMT prepared by the New York State Department of Transportation. The same growth rates were applied to the base year vehicle population by source type and road type distributions. Vehicle age distributions were grown using the EPA's "Age Distribution Projection Tool for MOVES3" (April 5, 2021 version). The projected fuel formulation data consisted of the year 2020 state specific data (2020 data was the most current at the time). The AVFT data was updated to estimate the additional number of electric vehicles New York would expect to have on the road from adopting the Advanced Clean Cars II Rule (ACCII). All other inputs remained the same as those used to develop the 2017 base year.

Detailed descriptions of NYSDEC's methodologies for developing the 2023 projection inputs can be found in Appendix H. The 2023 annual and OSD emission estimates can be found in Appendix D2.

Nonroad Sources Methodology

Nonroad Equipment

The nonroad MOVES model assigns constant hours-per-year activity rates to each piece of nonroad equipment, and changes in emissions for projection years are approximated by estimating changes in nonroad engine populations.[17] The

[16] National-Emissions-Collaborative_2016v1_ERTAC-EGU_20Jan2023.docx (colostate.edu)
[17] See EPA's *Nonroad Engine Population Growth Estimates in MOVES2014b* for more detail.

2023 projection emissions from nonroad sources were estimated using MOVES3.

The meteorology and fuel supply data used for the 2023 projection were the same data used for the 2017 base year. The 2023 fuel formulation data was updated with 2020 RVP and Sulfur content based on sampling results. The updated RVP and Sulfur content values were obtained from NYSDEC's Bureau of Mobile Sources and Technology Department. The 2020 data was the most current data available at the time.

Commercial Marine Vessels

CMV emissions for New York State for 2023 projections are based on the 2017 NEI developed by EPA and estimated growth factors developed by MARAMA. MARAMA developed 2023 growth factors based on a multi-state work effort. MARAMA used the "best available" data from economic, energy, and demographic activity parameters as surrogates for projecting future emissions. 2017 NEI emissions were multiplied by the MARAMA growth factors for 2023 to calculate 2023 projection emissions.

Resources for 2023 projections methodology for CMV (available upon request):

- 2017 National Emissions Inventory Technical Support Document, January 2021
- 2017 National Emissions Inventory Data
- MARAMA Growth Rates Data
- Emissions Inventory System Gateway
- MARAMA Inventory Projection Methodology, July 2022

Locomotives and Rail Yards

Annual Rail emissions for New York State for 2023 are based on the 2017 NEI developed by EPA and MARAMA growth factors. MARAMA developed 2023 growth factors based on a multi-state work effort. MARAMA used the "best available" data from economic, energy, and demographic activity parameters as surrogates for projecting future emissions. 2017 NEI emissions were multiplied by the MARAMA growth factors for 2023 to calculate 2023 projection emissions.

Resources for 2017 base year methodology and 2023 projections for locomotives and rail yards (available upon request):

- 2017 National Emissions Inventory Technical Support Document, January 2021
- 2017 National Emissions Inventory Data
- MARAMA Growth Rates Data
- Emissions Inventory System Gateway
- MARAMA Inventory Projection Methodology, July 2022

Airports

To project the 2017 airport emissions data to 2023, NYSDEC relied on growth factors developed by MARAMA in the 2011 Beta2 Inventory (see Appendix N). Future year airport emissions projections were calculated by applying airport and SCC-specific growth factors to the 2017 emissions data. These growth factors were developed from itinerant (ITN) operations at airports. ITN operations are aircraft landings and take-offs (LTOs) where an aircraft takes off from one airport and lands at another airport, or the aircraft lands at one airport after taking off from another airport. The ITN data were obtained from the Federal Aviation Administration's (FAA) Terminal Area Forecast system. EPA applied a cap of 2.0 (100 percent increase) on projection factors for state-level defaults and 5.0 for airport-specific entries.

The 2023 growth factors were applied to the 2017 annual emissions to obtain 2023 projected emissions. Additional airport emissions data are provided in Appendix E4. 2023 OSD emissions were calculated by dividing the annual emissions data by 365 days per year.

Biogenic Sources Methodology

Biogenic emissions levels were determined using BEIS4 and the updated BELD6 land use data. NYSDEC assumed no change in biogenic emissions between 2017 and 2023.

Emissions Changes between 2017 and 2023 - Summary

Table 17 and Table 18 summarize the difference in emissions between 2017 and 2023. Negative numbers denote a decrease in emissions. Specifically, Table 17 summarizes the emissions difference on a tons-per-OSD basis within the NYMA and categories

Table 18 summarizes the difference on a percentage basis within the NYMA.

Table 17. 2017 to 2023 NYMA OSD Emissions Difference

2017 to 2023 NYMA OSD Emissions Difference		
Source Category	**NO_x (tons)**	**VOC (tons)**
Point	6	1
Point w/ RE	6	1
Nonpoint	0	2
Nonroad	-17	-10
On-Road	-42	-10
All-Sectors*	-53	-17

*Point source emissions with RE not included in the total for all categories

Table 18. 2017 to 2023 NYMA OSD Emissions Difference

2017 to 2023 NYMA OSD Emissions Difference		
Source Category	**NO_x**	**VOC**
Point	4.23%	5.20%
Point w/ RE	4.23%	1.74%
Nonpoint	0.05%	0.70%
Nonroad	-15.65%	-11.22%
On-Road	-39.08%	-19.14%
All-Sectors*	-50.45%	-24.47%

*Point source emissions with RE not included in the total for all categories

Motor Vehicle Emissions Budget for SIP and Conformity Purposes

The CAA prohibits federally funded projects from interfering with the ability of a state to attain and maintain the NAAQS. Consequently, the EPA established "conformity" criteria and procedures for two categories of federal activities, (1) transportation-related plans, programs, and projects (under 40 CFR part 93 subpart A), and (2) non-transportation-related "general" activities (under 40 CFR part 93 subpart B or "Subpart B"). Conformity requirements apply in areas that either do not meet or previously have not met the NAAQSs for ozone, CO, PM_{10}, $PM_{2.5}$, or NO_2.

Transportation Conformity

Metropolitan planning organization (MPO) policy boards involved in transportation planning are generally responsible for determining if projects and overall transportation implementation plan (TIP) in their area conform to the state's SIP. In New York, the New York State Department of Transportation (NYSDOT), NYSDEC, the Federal Highway Administration (FHWA), the Federal Transit Administration (FTA), and the EPA are also involved in the transportation conformity process. A guidance document published by the United States Department of Transportation in 2017 for State and local officials who are involved in decision making on transportation investments promotes public understanding of Transportation Conformity.[18]

In New York, 6 NYCRR Part 240, Transportation Conformity, codifies NYSDEC's transportation conformity requirements. 6 NYCRR 240-2.7(b), Emissions budget, establishes NYSDEC's procedures for establishing a motor vehicle emissions budget for inclusion in the SIP. Pursuant to 6 NYCRR 240-1.1(b)(20), the definition of "motor vehicle emission budget (MVEB)" is "That portion of the total allowable emissions defined in the applicable submitted or approved control strategy SIP revision or maintenance plan for a certain date for the purpose of meeting reasonable further progress milestones or demonstrating attainment or maintenance of the NAAQS, for any criteria pollutant or its precursors, allocated to highway and transit vehicle use and emissions." New York does not have a "General Conformity" regulation.

Motor Vehicle Emission Budget

As stated above, a MVEB is that portion of the total allowable emissions in the SIP that is allocated to on-road mobile sources, such as cars, trucks, and buses. It is the level of on-road emissions that the area can have and still meet the SIP's goals. For transportation conformity, projected emissions from highway and public transportation use must be less than or equal to the budgets.

NYSDEC is establishing the MVEB for 2023 in this SIP revision. It was developed using the latest planning assumptions, emissions inventories, and MOVES3. It should be noted that the 2023 MVEB is a projection from

[18] See fhwahep17034.pdf (dot.gov)

the 2017 emissions inventory, and that the 2023 VOC MVEB excludes emissions from refueling.

Table 19. 2023 Motor Vehicle Emission Budget

2023 Motor Vehicle Emission Budget		
Year	**VOC (tpd)**	**NO_X (tpd)**
2023	39.27	65.66

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Section 2: Reasonable Further Progress (RFP) (Clean Air Act Sections 172(c)(2) & 182(b)(1))

Reasonable Further Progress (RFP) is defined by section 171(1) of the CAA as ‘‘such annual incremental reductions in emissions of the relevant air pollutant as are required by [part D of title I] or may reasonably be required by the Administrator for the purpose of ensuring attainment of the applicable [NAAQS] by the applicable date.’’

The RFP requirements for the 2015 ozone NAAQS are codified in 40 CFR 51.1310 and are specified in EPA’s implementation rule for the 2015 ozone NAAQS.[19] The implementation rule states: “For the purposes of the 2015 ozone NAAQS, the EPA continues to interpret CAA section 172(c)(2) as requiring moderate areas with an approved SIP under the 1-hour ozone NAAQS or prior 8-hour ozone NAAQS to achieve 15 percent ozone precursor (NO_X and/or VOC) emission reductions over the first 6 years after the RFP baseline year for the 2015 ozone NAAQS.”[20]

Since NYMA previously met the 15 percent RFP requirements solely through VOC reductions for the 1997 ozone NAAQS, NYSDEC is now allowed to and is satisfying the NYMA’s 2015 ozone NAAQS RFP requirement of 15 percent through a combination of VOC and NO_X reductions. This 15 percent emission reduction requirement must be met by the end of the six-year period regardless of whether the area attains the NAAQS. The emission reduction calculations in this section uses inventory data that include RE.

Pursuant to 6 NYCRR Section 231-2.6, emission reduction credits (ERCs) may be created from past or future emissions reductions resulting from facility shutdown, emission unit shutdown, curtailment, source reduction, over-control of emissions beyond an applicable limit or any other reduction mechanism acceptable to the department that occurred after November 15, 1990. Any source can apply to create ERCs that can later be used by the same owner or transferred to a different source. Emission reductions that were included in the base year and projection year emission inventories could be emitted later if a facility applies for emission reduction credits for those emissions. To be sure that the 15% emission reduction requirement for RFP is met, NYSDEC includes available ERCs in the RFP calculations.

EPA no longer requires the calculation of non-creditable emissions reductions because of the minimal effect of their exclusion. This includes measures related to motor vehicle exhaust or evaporative emissions promulgated before January 1, 1990; regulations concerning Reid vapor pressure promulgated before November 15, 1990; measures to correct previous RACT requirements; and measures required to correct previous I/M programs.

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[19] “Implementation of the 2015 National Ambient Air Quality Standards for Ozone: Nonattainment Area State Implementation Plan Requirements.” Final Rule. Published December 6, 2018; effective February 4, 2019. 83 FR 62998-63036.

[20] Ibid. p.63004.

VOC Emission Reductions for RFP

NYSDEC used the following steps to calculate the VOC emission reductions that occurred between 2017 and 2023 and determine if it meets RFP. A 15 percent reduction in VOC emissions is the goal, but NO_X emission reductions may be used to fulfill the RFP requirements in the event of a VOC emission reduction shortfall.

Step 1: Compile the base year anthropogenic inventory for VOC emissions and ERCs available in 2017 in the NYMA. Table 20 contains the same emissions data as Table 11 in Section 1 of this document plus available VOC ERCs.

Table 20. 2017 NYMA Anthropogenic VOC Emissions Inventory for RFP

Source Category	VOC Emissions (tpd)
Point w/ RE	28.66
Nonpoint	234.67
Nonroad	87.41
On-Road	50.41
Available VOC ERCs	2.45
Total	403.60

Step 2: Multiply the base year anthropogenic inventory from Step 1 by 0.85 to identify the 2023 VOC emissions level needed to satisfy the 15 percent RFP requirement.

403.60 tpd VOC * 0.85 = 343.06 tpd VOC

Step 3: Determine the 2023 projection year anthropogenic inventory for VOC emissions for the NYMA. Table 21 contains the same data as Table 12 in Section 1 of this document plus available VOC ERCs.

Table 21. 2023 NYMA Anthropogenic VOC Emissions Inventory for RFP

Source Category	VOC Emissions (tpd)
Point w/ RE	29.16
Nonpoint	236.31
Nonroad	77.61
On-Road	38.48
Available VOC ERCs	2.39
Total	383.95

Step 4: Compare the 2023 projection year anthropogenic VOC inventory for the NYMA (determined in step 3) to the 2023 VOC emissions needed to meet RFP (determined in step 2).

Comparison of VOC emission totals in Steps 2 and 3 shows that there is a VOC emission reduction shortfall of 40.89 tpd (383.95 tpd – 343.06 tpd) that is needed to demonstrate RFP through 2023. Therefore, NO_X reductions must be relied upon to meet the 15% RFP requirement. Since there is no longer a requirement for a portion of VOC reductions to be held to fulfill the contingency measure requirement for RFP,[25] the VOC emission reduction shortfall to demonstrate RFP is still 40.89 tpd or 10.13 percent (40.89 tpd / 403.60 tpd).

NO_X Emissions Reductions for RFP

Step 1: Compile the base year anthropogenic inventory for NO_x emissions and ERCs available in 2017 in the NYMA. Table 22 contains the same emissions data as Table 11 in Section 1 of this document plus available VOC ERCs.

Table 22. 2017 NYMA Anthropogenic NO_X Emissions Inventory for RFP

Source Category	**NO_X Emissions (tpd)**
Point w/ RE	131.61
Nonpoint	45.08
Nonroad	108.17
On-Road	107.78
Available NO_X ERCs	27.80
Total	420.44

Step 2: Multiply the base year anthropogenic inventory from Step 1 by 0.8987 (1 – 10.13 percent VOC emission reduction shortfall) to determine the 2023 NO_X emissions to needed to satisfy the RFP requirement.

420.44 tpd NO_X * 0.8987 = 377.84 tpd NO_X

Step 3: Determine the 2023 projection year anthropogenic inventory for NO_x emissions for the NYMA. Table 23 contains the same data as Table 12 in Section 1 of this document plus available VOC ERCs.

Table 23. 2023 NYMA Anthropogenic NO_X Inventory for RFP

Source Category	**NO_x Emissions (tpd)**
Point w/ RE	137.17
Nonpoint	45.10
Nonroad	91.24
On-Road	61.90
Available NO_X ERCs	26.38
Total	361.79

Step 4: Compare the 2023 projection year anthropogenic NO_X emissions inventory for the NYMA (determined in step 4) to the 2023 NO_X emissions level needed to satisfy the RFP requirement (determined in step 2).

The NO_X emissions projection for 2023 is 361.79 tpd, well below the 377.84 tpd NO_X need to satisfy the RFP requirement.

Conclusion

This SIP revision demonstrates that the 15% emission reduction RFP requirement pursuant to CAA section 182(b)(1) and 40 CFR 51.1310 for the NYMA has been satisfied with a combination of VOC and NO_x emission reductions.

Section 3: Contingency Measures for Failure to meet RFP (VOCs and NO_x)

Contingency measures are additional controls that must be implemented pursuant to CAA section 172(c)(9) if a nonattainment area fails to meet an RFP milestone or attain the NAAQS by the applicable deadline. Such measures must take effect in any such case without further action by the state or the Administrator. These requirements were upheld in the January 29, 2021, court decision *Sierra Club v. EPA* which found that contingency measures only become operational and therefore enforceable when the "triggering conditions" occur pursuant to the "plain text" of the CAA.[21]

On March 17, 2023, EPA released "Draft Guidance on the Preparation of State Implementation Plan Provisions that Address the Nonattainment Area Contingency Measure Requirements for Ozone and Particulate Matter."[22] As of July 19, 2024, this guidance has not been finalized. NYSDEC is reviewing this information to evaluate if there are additional regulatory options that could be used to meet the contingency measure requirements pursuant to CAA section 172(c)(9) and relevant case law. NYSDEC anticipates continuing review and discussion with EPA on this issue while the draft guidance is evaluated further by stakeholders and eventually finalized.

NYSDEC contends that contingency measures for failure to meet RFP are not needed because the RFP demonstration in Section 2 of this SIP revision demonstrates that NYMA has achieved the required ozone precursor emission reductions between 2017 and 2023.

[21] *Sierra Club v. Environmental Protection Agency,* 21 F.4th 815 (D.C. Cir. 2021)

[22] https://www.epa.gov/air-quality-implementation-plans/draft-contingency-measures-guidance

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Section 4: Nonattainment New Source Review

New major stationary sources of air pollution (as defined by the CAA) and major stationary sources which undertake major modifications are required to obtain a permit before commencing construction. The review process through which permits are issued is known as new source review (NSR). NSR is required for major sources whether the source or modification is in an area classified as attainment, nonattainment, or unclassifiable.

For nonattainment areas, the permits are called nonattainment NSR (NNSR) permits. Permits for sources in attainment areas are referred to as Prevention of Significant Deterioration (PSD) permits. NSR encompasses both the NNSR and PSD permit programs.

The NSR program is in place to protect the air quality in the areas where sources are being constructed or modified, as well as areas that might be affected by transport. These programs are integral to the success of the various SIP efforts, ensuring that new major sources and modifications to existing sources do not interfere with attainment and maintenance of the NAAQS or exacerbate air quality problems in existing nonattainment areas.

New York implements the NSR permitting program through 6 NYCRR Part 231, “New Source Review for New and Modified Facilities.” The version of 6 NYCRR Part 231 that is currently in effect is already incorporated into the SIP and satisfies the federal requirements for the NYMA “moderate” nonattainment area for the 2015 ozone NAAQS.

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Section 5: Inspection/Maintenance (Basic)

The basic vehicle inspection and maintenance requirement is satisfied by various subparts of 6 NYCRR Part 217, “Motor Vehicle Emissions” that are already approved in the New York SIP.

An updated Performance Standard Modeling (PSM) analysis that used MOVES3.1 with an updated vehicle mix and 2017 meteorology is included as Appendix O. The PSM analysis demonstrates that the current New York I/M program continues to satisfy CAA section 182(b)(4) requirements for the NYMA “moderate” nonattainment area for the 2015 ozone NAAQS.
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