Moderate Nonattainment Requirements
2015 Ozone Standards

Reasonable Further Progress and Milestones
Transportation Conformity
Motor Vehicle Emissions Budgets
Vehicle Inspection and Maintenance (I/M) Program

Connecticut Department of Energy and Environmental Protection
Bureau of Air Management
State Implementation Plan Revision

Final..... April 2025

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ACRONYMS and ABBREVIATIONS

ACT	Alternate Control Technique
AEO	Annual Energy Outlook
afdust	Fugitive Particulate Dust Emissions (Modeled)
CAA	Clean Air Act
CARB	California Air Resources Board
CFR	Code of Federal Regulations
CGS	Connecticut General Statutes
cmv_c1c2	Commercial Marine Vessel Emissions (Modeled)
cmv_c3	Commercial Marine Vessel Emissions – Large (Modeled)
CoST	Control Strategy Tool
CSAPR	Cross-State Air Pollution Rule
CTDOT	Connecticut Department of Transportation
CTG	Control Techniques Guidelines
DEEP	Department of Energy and Environmental Protection (Connecticut)
DMV	Department of Motor Vehicles (Connecticut)
EGU	Electric Generating Unit
EPA	Environmental Protection Agency (United States)
FR	Federal Register
GHG	Greenhouse Gas
GVWR	Gross Vehicle Weight Rating
ICAO	United Nations International Civil Aviation Organization
I/M	Inspection and Maintenance
IPM	Integrated Planning Model
lbs	Pounds
LEV	Low Emission Vehicle
MARAMA	Mid-Atlantic Regional Air Management Association
MATS	Mercury and Air Toxics Standards
MOVES	Motor Vehicle Emission Simulator
MVEB	Motor Vehicle Emission Budget
MWC	Municipal Waste Combustor
MY	Model Year
NAAQS	National Ambient Air Quality Standards
NEI	National Emission Inventory
NESCAUM	Northeast States for Coordinated Air Use Management
NHTSA	National Highway Traffic Safety Administration
NLEV	National Low Emission Vehicle Program
NO_2	Nitrogen Dioxide
nonpt	Area Sector Emissions (Modeled)
NOx	Oxides of Nitrogen
np_oilgas	Area Sector Oil and Gas Emissions (Modeled)
NSPS	New Source Performance Standard

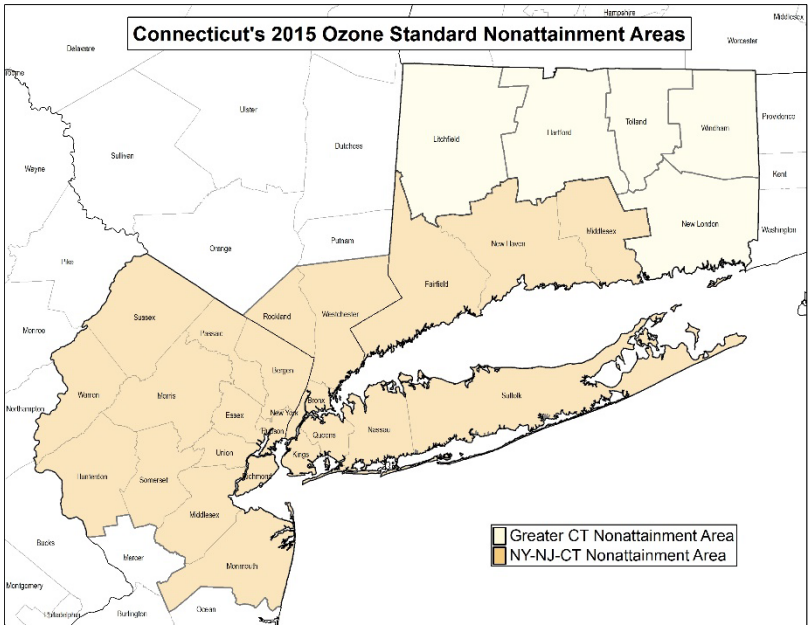
OBD	On-Board Diagnostics
othafdust	Area Sector Fugitive Dust Emissions from Canada (Modeled)
othpt	Point Sector Emissions from Canada and Mexico (Modeled)
othptdust	Point Sector Fugitive Dust Emissions from Canada (Modeled)
OTC	Ozone Transport Commission
OTR	Ozone Transport Region
PFC	Portable Fuel Container
PM2.5	Fine Particulate Matter
ppb	parts per billion
ppm	parts per million
pt_oilgas	Point Sector Oil and Gas Emissions (Modeled)
ptegu	Point Sector Electric Generating Unit Emissions (Modeled)
ptnonipm	Point Sector Industrial Activity Emissions (Modeled)
RACM	Reasonably Available Control Measure
RACT	Reasonably Available Control Technology
RCSA	Regulations of Connecticut State Agencies
RFP	Reasonable Further Progress
RWC	Residential Wood Combustion
SI	Spark-ignition
SIP	State Implementation Plan
SMOKE	Sparse Matrix Operator Kernel Emissions/Inventory Data Analyzer
SO_2	Sulfur Dioxide
TCM	Transportation Control Measure
TSD	Technical Support Document
USDOT	United States Department of Transportation
VMT	Vehicle Miles Traveled
VOC	Volatile Organic Compound
ZEV	Zero Emission Vehicle

1 Introduction and Background

1.1 Purpose of Document

This document presents the Connecticut Department of Energy and Environmental Protection's (DEEP) outstanding air quality state implementation plan (SIP) requirements regarding prior classifications of moderate nonattainment under the 2015, 70 ppb 8-hour National Ambient Air Quality Standards (NAAQS) for ozone. Connecticut's two nonattainment areas, Greater Connecticut and the Southwest Connecticut portion of New York – New Jersey – Connecticut (NY-NJ-CT) (shown in Figure 1-1), were required, under the moderate nonattainment classification, to attain the ozone NAAQS by August 3, 2024.

Figure 1-1. *Map of Connecticut's Nonattainment Areas.*



On December 7, 2023, DEEP proposed a SIP, including elements in this document, assessing attainment of the NAAQS by the attainment date. DEEP took comments on the proposed SIP and associated control measures through January 23, 2024. The proposed SIP asserted that attainment for the 2015 ozone NAAQS in Connecticut can only be assured by securing additional emission reductions through control of sources that are outside the scope of Connecticut's authority to control, as well as through the implementation of more stringent emission standards on new light, medium, and heavy-duty vehicles in Connecticut and throughout the Ozone Transport Region (OTR).

As air quality monitoring data indicated neither area was likely to attain the NAAQS by the required date, on June 13, 2024, Connecticut requested under Clean Air Act (CAA) §181(b)(3) to reclassify Southwest Connecticut to serious nonattainment and made a conditional request to reclassify the Greater Connecticut nonattainment area to serious nonattainment.[1] The conditions to avoid reclassification outlined in DEEP's June 13, 2024, letter to EPA were not met prior to the attainment date and EPA reclassified the Southwest Connecticut nonattainment area and the Greater Connecticut nonattainment area to serious nonattainment on July 25, 2024,[2] and July 29, 2024,[3] respectively. While the reclassifications to serious nonattainment allow more time for development of control strategies to attain the standards, certain plan requirements associated

[1] See: https://portal.ct.gov/-/media/deep/air/ozone/ozoneplanningefforts/connecticutozonereclassificationrequest6132024.pdf
[2] https://www.govinfo.gov/content/pkg/FR-2024-07-25/pdf/2024-16244.pdf
[3] https://www.govinfo.gov/content/pkg/FR-2024-07-29/pdf/2024-16415.pdf

with the moderate classification must be addressed in the SIP. This document addresses those outstanding SIP elements.

Additional information regarding Connecticut's ozone attainment planning can be found at: https://portal.ct.gov/DEEP/Air/Planning/Ozone/Ozone-Planning-Efforts.

1.2 Plan Requirements

Section 172 of the CAA outlines the general nonattainment plan provisions and CAA section 182 requires additional plan requirements for ozone nonattainment areas based on classification status. Additionally, if the area is in the OTR, as Connecticut is, there are additional requirements under CAA section 184. Furthermore, implementation plans from earlier nonattainment designations may be required to remain in place to attain or maintain compliance with the previous standards.

CAA section 182(i) addresses reclassified areas and allows adjustments to the submittal schedule for attainment plan requirements, but the section does not allow for an extension to the required attainment date beyond the date for the new classification. CAA sections 182(a) and 182(b) outline the ozone SIP requirements specific to marginal and moderate areas. The implementation rule for the 2015 ozone NAAQS, adopted August 3, 2018,[4] is codified in 40 CFR 51 Subpart CC.

Subpart CC was revised on January 17, 2025, as EPA finalized the ozone reclassification rule [90 FR 5651] to establish revised timeframes for submittal of SIP elements applicable to reclassified areas. The reclassification rule recognizes that certain SIP elements, such as the attainment demonstration, are tied to the attainment date and should be revised and submitted on a schedule appropriate to the new attainment date, while other elements require additional time to update. DEEP intends to submit these elements as expeditiously as practicable but no later than January 1, 2026, in accordance with the ozone reclassification rule.

The following requirements for the nonattainment areas were addressed in recent DEEP actions as described briefly below.

- Emissions offsets from new major sources and modifications are required at a ratio of 1.15 to 1 for moderate areas. However, because Connecticut's nonattainment areas had, under prior designations, been classified as serious and severe nonattainment, offsets continue to be required at more stringent ratios of 1.2 to 1 and 1.3 to 1. Connecticut's rules for obtaining offsets from new and modified sources, as well as other new source review requirements, are contained in the Regulations of Connecticut State Agencies (RCSA) 22a-174-3a.

[4] Implementation Rule for the 2015 NAAQS: 83 FR 62998

- For states in the OTR, the new source review major source threshold is reduced from the usual 100 tons per year for a moderate area to 50 tons per year for sources emitting VOCs [CAA 184(b)(2)]. Connecticut defines major sources and major modifications in RCSA 22a-174-1, and the thresholds are at least as stringent as required for moderate nonattainment areas located in the OTR. Further details demonstrating that Connecticut's SIP adheres to the requirements for nonattainment new source review can be found in our Nonattainment New Source Review Certification.

- Reasonably Available Control Technology (RACT) is required for all EPA-defined control technique guideline (CTG) sources and all major sources of VOC and NOx. Reasonably Available Control Measures (RACM) are required for all other sources. Plans to implement any necessary RACT and RACM were updated for the moderate classifications under the 2015 NAAQS and submitted to EPA.[5] Connecticut withdraws from further consideration the RACM for Southwest and Greater Connecticut moderate nonattainment plans due to its voluntary reclassification request and will submit a new RACM for these areas at a later date.

- Submittal of an inventory of sources and periodic emissions inventory updates are required every three years. Connecticut has been submitting periodic emissions inventories every three years since 1990 and continues to do so as required under the 2015 ozone NAAQS. Connecticut uses 2017 as the base year in determining reasonable further progress in securing emissions reductions. The point source sector of the inventory relies on the actual emissions reported though Connecticut's emissions statement program. Connecticut maintains its emissions statement program as approved in its infrastructure SIP for the 2015 NAAQS [85 FR 50953] and recently recertified.

Relevant portions of the SIP as described above are in process or have been revised, updated and recertified as required and are available for further review on DEEP's website.[6]

This submittal addresses the following remaining moderate area requirements:

- Reasonable Further Progress (RFP) and milestone compliance demonstration showing Connecticut achieved 15 percent VOC reduction within 6 years after the baseline year of 2017 (i.e., reductions must occur by 2023).
- Transportation conformity budgets consistent with the RFP year (i.e., 2023).
- Basic Inspection and Maintenance (I/M) for light-duty motor vehicles.

[5] https://portal.ct.gov/DEEP/Air/Planning/Ozone/Reasonably-Available-Control-Technology
[6] https://portal.ct.gov/DEEP/Air/Planning/SIP/Air-SIP-Revisions--Other-State-Plans-for-Control-of-Air-Pollution

2 Base Year and Future Year Emission Estimates

The Implementation Rule for the 2015 National Ambient Air Quality Standards (Implementation Rule)[7] established the requirements for a base year inventory and a periodic emissions inventory (PEI) every three years thereafter for states to satisfy sections 182(a)(1) and 182(a)(3)(A) of the CAA, respectively.

The Implementation Rule establishes that the base year inventory should be consistent with the baseline year for demonstrating Reasonable Further Progress (RFP) to obtain minimum required emission reductions. The Implementation Rule further specifies that the baseline emissions inventory for RFP should be the triennial emissions inventory year nearest to the time of designation as nonattainment. Connecticut was designated nonattainment for the 2015 ozone standards in 2018, at which time the most recent triennial inventory year was 2017. Therefore, Connecticut is using 2017 for the base year inventory.

Additional guidance on development of inventories used is provided by EPA in Emissions Inventory Guidance for Implementation of Ozone and Particulate Matter National Ambient Air Quality Standards (NAAQS) and Regional Haze Regulations, EPA-454/B-17-002, May 2017. DEEP has worked with EPA to develop these triennial inventories and commits to continue to develop and submit PEI.

This section summarizes the emissions of ozone precursors (i.e., VOC and NOx) from Connecticut's two nonattainment areas, Greater Connecticut and the Southwest Connecticut portion of the NY-NJ-CT nonattainment area, in the baseline year of 2017. This section also provides descriptions of control measures, including those relied upon to meet CAA reasonable further progress (RFP) and attainment requirements, and provides estimates of projected 2023 emissions in Connecticut's nonattainment areas resulting from state and federal measures.

2.1 2017 Base Year Ozone Season Day Inventory

Connecticut's 2017 RFP base year inventory draws on data from the 2017 National Emissions Inventory (NEI). The data in the NEI is developed primarily from source information submitted by State and Local agencies and supplemented by EPA. The NEI provides annual estimates of VOC and NOx emissions with sources grouped into the following general categories:

- **Stationary Point Sources:** Industrial or commercial operations classified in 2017 as major sources of VOC or NOx are included in the point source inventory. Examples include power plants (also referred to as electric generating units or EGUs), municipal waste combustors (MWC), factories, large industrial and commercial boilers and other fuel burning equipment. Also included in the point source inventory are emissions from aircraft (landings and take-offs), airport ground support equipment (GSE), and railyard locomotives.

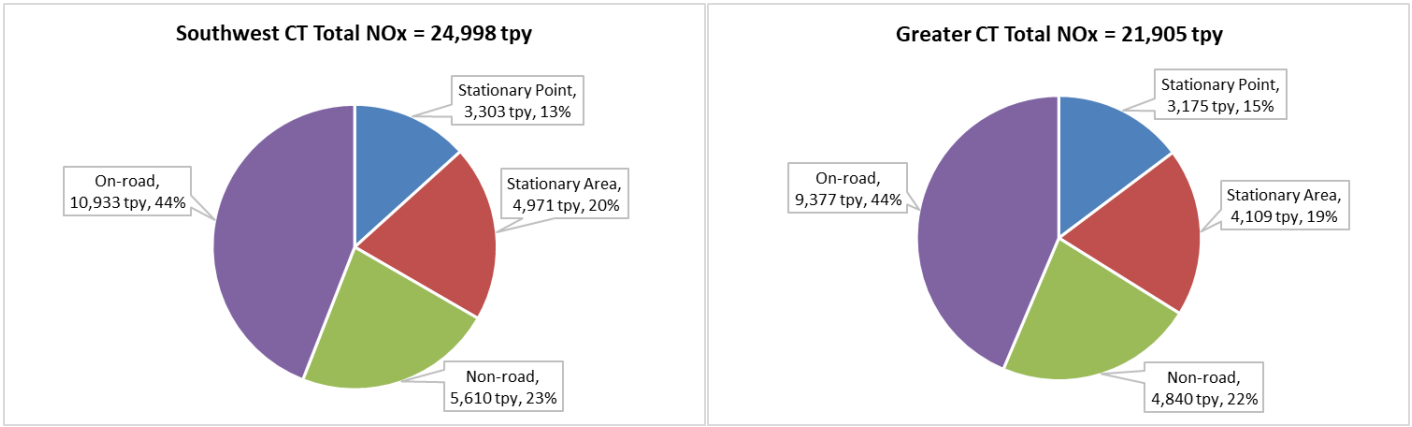
[7] "Implementation of the 2015 National Ambient Air Quality Standards for Ozone: State Implementation Plan Requirements"; 83 FR 62998; December 6, 2018.

- **Stationary Area Sources**: Also called nonpoint sources, these stationary sources are too small to be inventoried individually as stationary point sources and are grouped by category in the inventory on a county total basis. Example categories include residential heating, commercial combustion, and commercial and consumer solvent use.

- **On-Road Mobile Sources:** Also referred to as highway mobile sources, these include exhaust and evaporative emissions from cars, buses, motorcycles, and trucks traveling on state and local roads. On-road emissions for 2017 were developed by the Connecticut Department of Transportation (CTDOT) using the MOVES model and were approved into Connecticut's SIPs for the 2008 ozone NAAQS for both the Greater Connecticut and Southwest Connecticut nonattainment areas.[8] Section 6 further explains the 2017 and 2023 motor vehicle emissions budgets used.

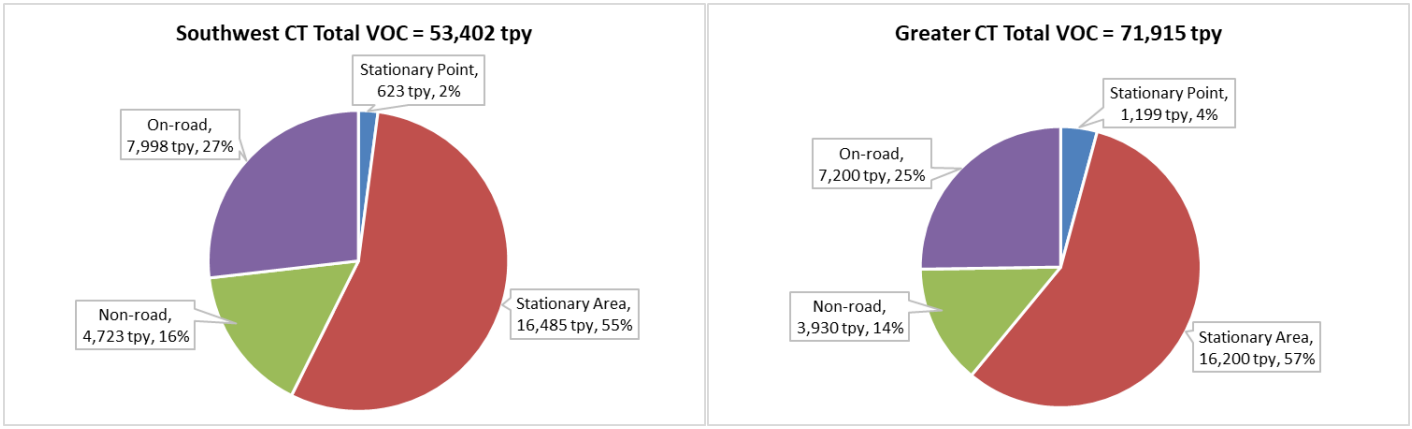
- **Non-Road Mobile Sources:** Also referred to as off-highway mobile sources, these include exhaust and evaporative emissions from mobile sources that are not generally traveling on state and local roads. Examples include construction equipment such as backhoes and graders; recreational equipment such as all-terrain vehicles and off-road motorcycles; commercial and residential lawn and garden equipment such as lawn mowers and leaf blowers; industrial equipment such as forklifts and sweepers and marine equipment such as recreational watercraft.

Figure 2-1. *2017 National Emissions Inventory NOx Emissions for Connecticut Nonattainment Areas in Tons per Year (tpy).*



[8] 83 FR 49297

Figure 2-2. *2017 National Emissions Inventory VOC Emissions for Connecticut Nonattainment Areas in Tons per Year (tpy).*



Ozone Season Day (OSD) Emissions

To determine ozone season day emissions, DEEP's analysis utilized detailed modeling platform data based on the 2017 NEI. DEEP used the 2017gb inventory which is documented in EPA's *Technical Support Document (TSD): Preparation of Emissions Inventories for the 2017 North American Emissions Modeling Platform* and available for download at EPA's website: https://gaftp.epa.gov/Air/emismod/2017/.

July was selected as the month most representative of the ozone season based on combined NOx and VOC emissions profiles shown for the modeling platform (see Figure 2-3 and Figure 2-4, below).

Figure 2-3. *2017 Ozone Precursor Emissions by Month in Southwest Connecticut.*

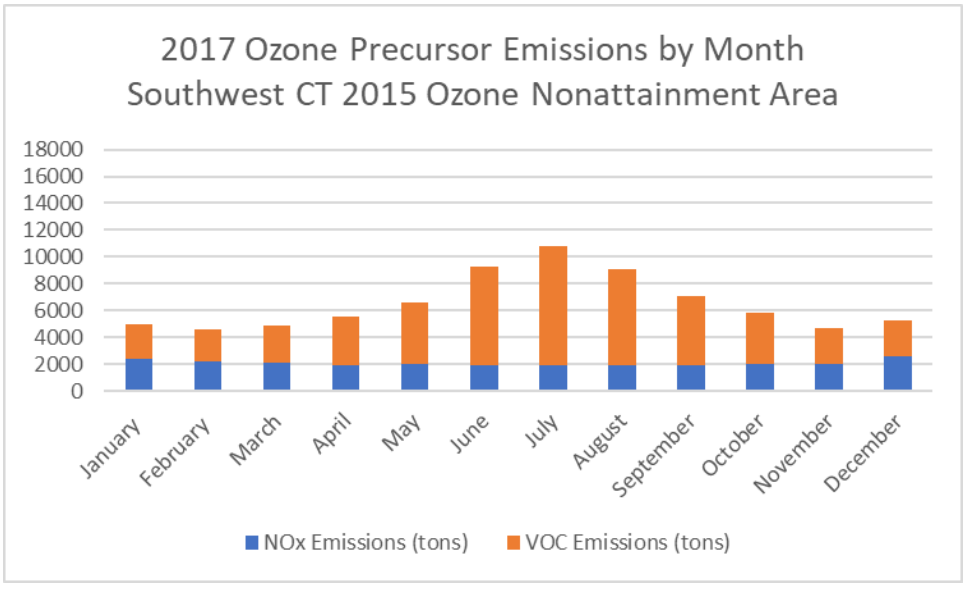
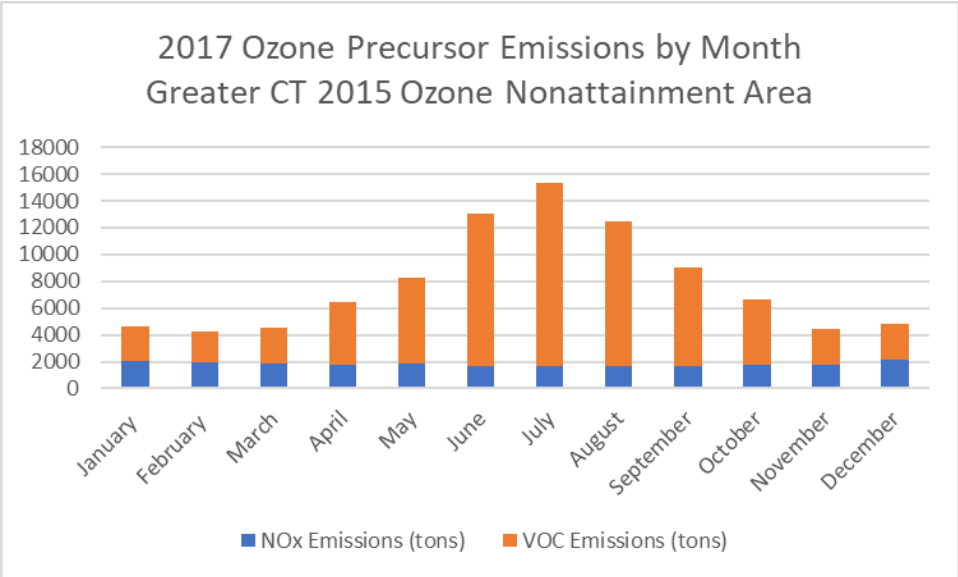
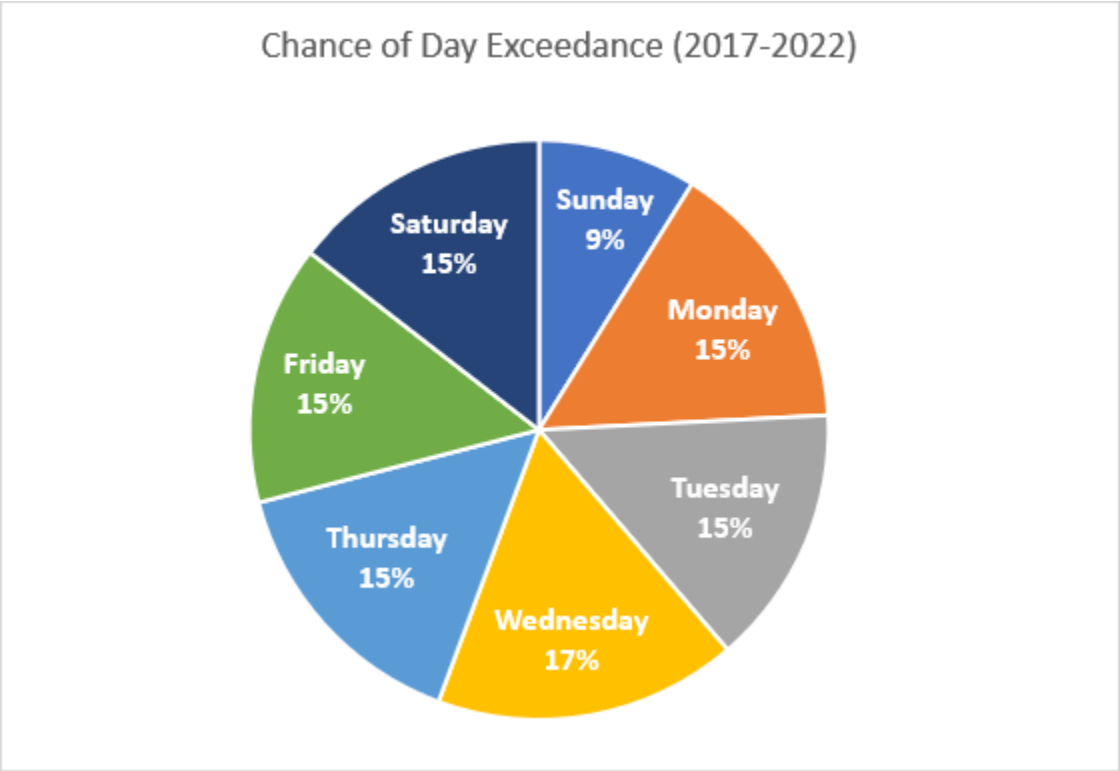


Figure 2-4. *2017 Ozone Precursor Emissions by Month in Greater Connecticut.*



Using data from 2017 through 2022, DEEP analyzed the typical occurrence of ozone events to determine if there was a day of week bias. If there was no bias, then the likelihood of an exceedance on any particular day of the week would be approximately 14.3 percent. Data in Figure 2-5 shows a slight bias toward Wednesday and away from Sunday. A Saturday exceedance is as likely to occur as most weekdays. Given the distribution of ozone exceedances and the likelihood of weekend exceedances, DEEP decided it was appropriate to include weekend emissions in the calculation of ozone season day emissions.

Figure 2-5. *Day of Week on which an Exceedance of the Ozone Standards in Connecticut occurred from 2017-2022 as Percentage.*



Therefore, ozone season day emissions were calculated based on emissions from July supplemented with motor vehicle emissions budgets. Summaries of Connecticut's 2017 base year anthropogenic emissions inventory, in tons per ozone season day, are provided in Table 2-1 and Table 2-2 below.

Table 2-1. *Summary of Southwest Connecticut Anthropogenic NOx and VOC Emissions for 2017 Ozone Season Day.*

Source Category	Ozone Season Day NOx (tons/ozone season day)	Ozone Season Day VOC (tons/ozone season day)
Stationary Point	7.7	1.6
Stationary Area	10.4	42.7
On-Road Mobile	24.6	17.6
Non-Road Mobile	15.0	18.5
Total Anthropogenic	57.7	80.4

Source: Estimates of 2017 emissions are based on EPA's 2017 inventory except for on-road mobile emissions which are from CTDOT's Air Quality Conformity Determination.

Table 2-2. *Summary of Greater Connecticut Anthropogenic NOx and VOC Emissions for 2017 Ozone Season Day.*

Source Category	Ozone Season Day NOx (tons/ozone season day)	Ozone Season Day VOC (tons/ozone season day)
Stationary Point	6.8	1.4
Stationary Area	10.4	42.4
On-Road Mobile	22.2	15.9
Non-Road Mobile	11.1	15.6
Total Anthropogenic	50.5	75.3

Source: Estimates of 2017 emissions are based on EPA's 2017 inventory except for on-road mobile emissions which are from CTDOT's Air Quality Conformity Determination.

Figure 2-6 and Figure 2-7 graphically depict the 2017 base year emission estimates for NOx and VOC emissions for Connecticut's nonattainment areas. In Southwest Connecticut, the largest contributing sectors to anthropogenic NOx emissions are on-road and non-road sources, contributing 43 percent and 26 percent, respectively. Stationary point (13 percent) and stationary area sources (18 percent) are lesser contributions. Similarly, in Greater Connecticut, the largest contributing sectors to anthropogenic NOx emissions are on-road and non-road sources, contributing 44 percent and 22 percent, respectively. Stationary area sources are also a larger contributor (21 percent), while stationary point sources are a smaller contributor (13 percent).

The largest sources of anthropogenic VOC emissions in Southwest Connecticut are stationary area (53 percent), non-road mobile (23 percent), and on-road mobile sources (22 percent), with stationary area sources only contributing two percent. The largest sources of anthropogenic VOC emissions in Greater Connecticut are stationary area (56 percent), non-road mobile (21 percent), and on-road mobile sources (21 percent), with stationary area sources only contributing two percent.

Figure 2-6. *2017 Base Year Anthropogenic NOx Inventories for Connecticut's Nonattainment Areas.*

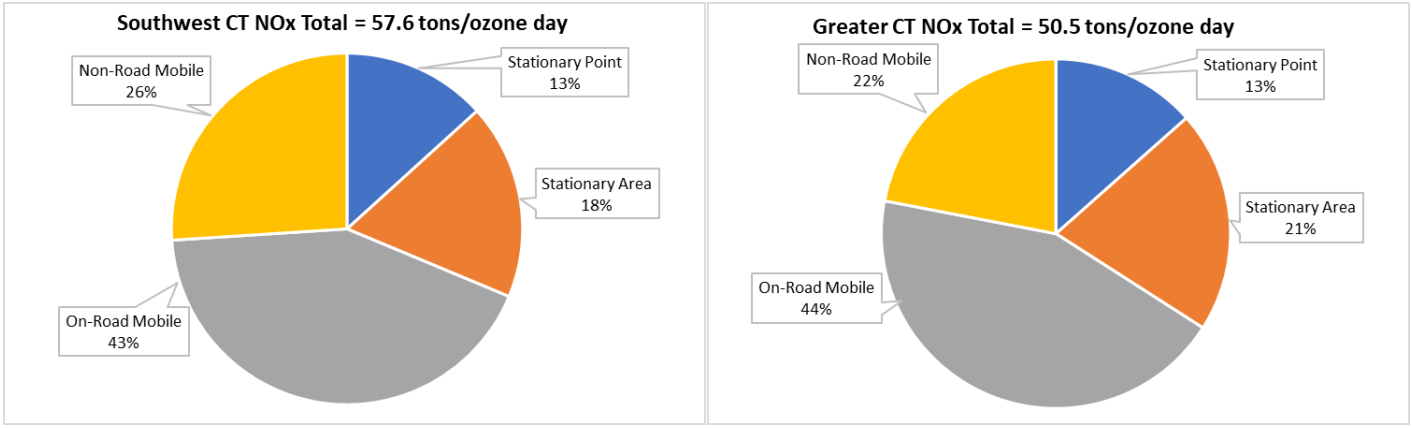
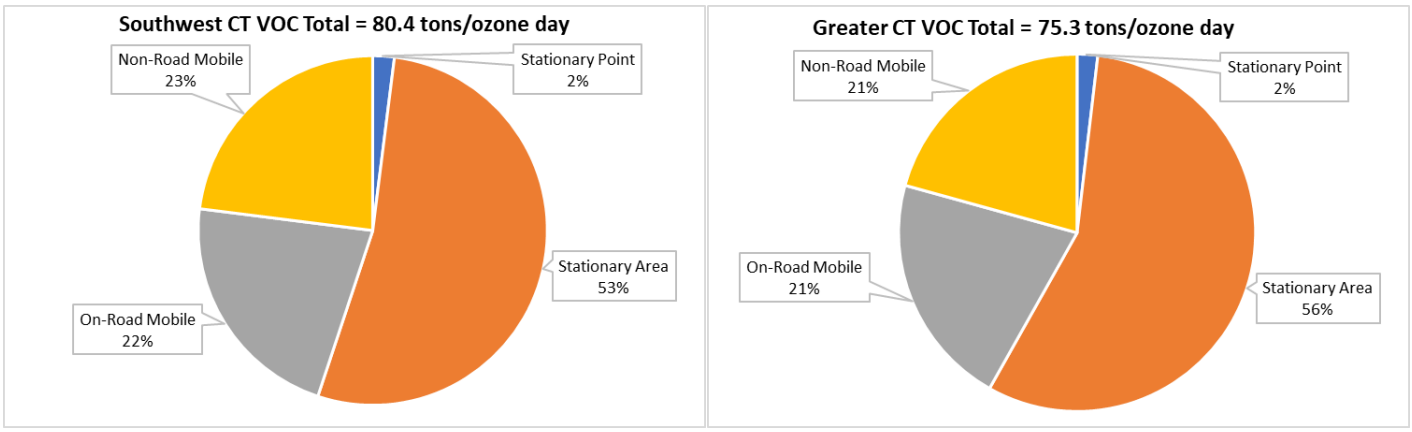


Figure 2-7. *2017 Base Year Anthropogenic VOC Inventory for Connecticut's Nonattainment Areas.*



On-road mobile sources are the largest source category for NOx emissions in both of Connecticut's nonattainment areas. In total, on-road mobile sources contribute 46.8 tons of NOx and 33.5 tons of VOC per ozone season day across Connecticut.

2.2 Control Measures Included in Future Year Projections

DEEP has implemented all emission control programs and measures mandated by the CAA as well as other measures necessary to meet RFP and RACT/RACM requirements in Southwest and Greater Connecticut for the 2015 ozone NAAQS under the moderate nonattainment designation. This section provides an overview of control measures put in place to reduce ozone precursor emissions covering the various sectors of the inventory. Many of these control measures have been in place prior to the existence of the 2015 standard and are required to provide ongoing emissions reductions in support of prior SIP submittals. Other measures, as noted, did not take effect until as recently as 2023. See Section 2.3 for a summary of projected 2023 emission levels that result from the post-2017 control measures.

Mobile Source and Fuels Control Programs

Numerous federal and state control programs have been implemented to reduce ozone precursor emissions from mobile sources. These programs have established increasingly more stringent emission standards for new on-road and non-road engines and equipment, with associated changes required for fuel composition, as well as implementation of inspection programs to ensure continued compliance by registered on-road motor vehicles. The gradual replacement of older on-road vehicles and non-road equipment due to purchases of newer models, coupled with increasingly stringent emission standards, has resulted in continuing reductions in ozone precursor emissions over time.

Table 2-3 provides a summary of major ozone precursor emission control programs implemented statewide in Connecticut for on-road vehicles that have occurred since the enactment of the 1990 Clean Air Act Amendments. Older programs are included in the table because they

continue to contribute to emission reductions in cases where owners replace older vehicles with more recent model year vehicles subject to tighter emission standards.

Federal programs establishing NOx and VOC emission standards for new cars and light/medium-duty trucks include the Tier 1 (phased-in between 1994 and 1996), National Low Emission Vehicle (NLEV, starting in 1998 in Connecticut), Tier 2 (phased-in between 2004 and 2009), and Tier 3 (phased-in between 2017 and 2025) programs. The Tier 3 program, originally approved in 2014 was amended and approved in 2015. Motorcycle emission standards were originally established in 2004 but were included in the amended Tier 3 program update in 2015. EPA also promulgated rules establishing emission standards for heavy-duty trucks in 2000.

Table 2-3. *On-Road Mobile Sources Control Strategies.*

Control Strategy	Pollutant		Federal Program	State Program	Rule Approval Date	Initial Year of Implementation
	VOC	NOx				
Tier 1 Vehicle Standards	•	•	•		6/5/1991	1994-1996
Reformulated Gasoline – Phases I & II	•	•	•		2/16/1994	1995 & 2000
On-board Refueling Vapor Recovery	•		•		4/6/1994	1997-2005
National Low Emission Vehicle (NLEV) Program	•	•	•		1/7/1998	1998-2003 (in CT)
Tier 2 Motor Vehicle Controls/30ppm Sulfur Gasoline	•	•	•		2/10/2000	2004-2009
Heavy-Duty Diesel Vehicle Controls and Fuels	•	•	•		10/6/2000[9]	2004-2005
CT OBD-II Enhanced I/M Program	•	•		•	12/5/2008[10]	2004
2007 Highway Rule/15ppm Sulfur Diesel Fuel	•	•	•		1/18/2001[11]	2006-2010
Highway Motorcycle Exhaust Emission Standards	•	•	•		1/15/2004[12]	2006-2010
CT Low Emission Vehicle Phase 2 (CT LEV2)	•	•	•	•	3/17/2015[13]	2007-2008
CT Low Emission Vehicle Phase 3 (CT LEV3)	•	•		•	8/1/2013[14]	2015-2025

[9] 65 FR 59896
[10] 73 FR 74019
[11] 66 FR 5002
[12] 66 FR 5002
[13] RCSA 22a-174-36b
[14] RCSA 22a-174-36c

Tier 3 Vehicle Standards/10ppm Sulfur Gasoline	•	•	•		4/28/2014[15]	2017-2025
Amendments to Tier 3 Motor Vehicle Emission and Fuel Standards – including motorcycles	•	•	•		2/19/2015[16]	2017-2025
The Safer Affordable Fuel-Efficient (SAFE) Vehicles Rule for Model Years 2021–2026 Passenger Cars and Light Trucks	•	•	•		4/30/2020[17]	2022-2026
Improvements for Heavy-Duty Engine and Vehicle Test Procedures, and Other Technical Amendments	•	•	•		12/30/2021[18]	2023 and later

Additional federally required fuel programs in place for on-road vehicles include lower volatility reformulated gasoline,[19] low sulfur gasoline,[20] and ultra-low sulfur diesel fuel.[21] The lower sulfur limits were necessary to minimize contamination of catalysts used to achieve greater tailpipe NOx emission reductions. In addition, federal rules required new cars and light/medium duty trucks to be equipped with on-board refueling vapor recovery (ORVR) systems[22] to control refueling emissions. The requirement was phased-in for new vehicles between 1997 and 2006. EPA also established rules[23] in 2000 that require HDVs, up to 10,000 lbs gross vehicle weight rating (GVWR), be equipped with ORVR systems. The ORVR systems for HDVs began to be equipped on model year 2004 vehicles and were fully phased in on HDVs by model year 2006. Most recently, EPA established the Safer Affordable Fuel-Efficient (SAFE) Vehicles Rule for Model Years 2021–2026 Passenger Cars and Light Trucks that increases the affordability of new and more efficient vehicles, reducing the GHG emissions released.

In addition to these federal programs, Connecticut has implemented several in-state programs to control emissions from mobile sources. After playing a major role in prompting EPA to promulgate the NLEV program in the late 1990's, Connecticut has continued to require new vehicles sold in the state to meet California's Low Emission Vehicle (LEV) standards, which are more stringent than federal requirements. In December 2004, DEEP adopted Regulations of Connecticut State Agencies (RCSA) section 22a-174-36b, which mirrors California's LEV II regulations and includes zero emission vehicle requirements.[24] The Connecticut LEV II regulation applies to model year 2008 through 2014 passenger car and light-duty trucks and model year 2009 through 2014 medium-duty vehicles. The LEV II standards also include a zero-emission vehicle (ZEV) provision, as well as GHG emission standards for 2009 through 2016 model year passenger cars, light-duty trucks, and medium-duty passenger vehicles. The CT LEV

[15] 79 FR 23414
[16] 80 FR 9078
[17] 85 FR 24174
[18] 85 FR 24174
[19] 40 CFR Part 80 Subpart D
[20] 40 CFR 1090.205
[21] 40 CFR 1090.305
[22] See https://www.epa.gov/ozone-pollution/fact-sheet-final-rule-determining-widespread-use-onboard-refueling-vapor-recovery. On May 16, 2012, EPA completed a finding (77 FR 28772) that ORVR technology was in widespread use, thereby enabling EPA to waive the requirement for affected states to implement Stage II refueling programs at gasoline stations due to the duplicative nature of the two programs. DEEP subsequently repealed its Stage II program on 7/8/2015.
[23] 65 FR 59896
[24] DEEP also submitted revisions to the LEV II program on 12/22/2005 and 8/4/2009.

II program was approved as a SIP revision by EPA in March 2015.[25] In August 2013, DEEP adopted RCSA section 22a-174-36c, which implements California's LEV III regulations to create increasingly more stringent emission standards for criteria pollutants and GHG for new passenger vehicles, light-duty trucks, and medium-duty passenger vehicles for model years 2015-2025. The CT LEV III program was approved as a SIP revision by EPA in July 2024.[26] For model years 2026 and later, Connecticut will be subject to the federal program for new vehicle emissions.

Federal Tier 3 Emission Standards and Gasoline Sulfur Requirements

On April 28, 2014, EPA published the final rule establishing the federal Tier 3 vehicle emission and fuel standards.[27] As with the Tier 2 program, Tier 3 was designed considering the vehicle and its fuel as an integrated system. The vehicle standards will reduce both tailpipe and evaporative emissions from passenger cars, light-duty trucks, medium-duty passenger vehicles, and some heavy-duty vehicles, resulting in significant reductions in pollutants such as ozone, particulate matter, and air toxics across the country. The Tier 3 standards are intended to harmonize with California's LEV program, thus creating a federal vehicle emissions program that will allow automakers to sell the same vehicles in all 50 states. The standards will be implemented over the same timeframe as the federal greenhouse gas/fuel efficiency standards for light-duty vehicles (promulgated by EPA and the National Highway Safety Administration in 2012), as part of a comprehensive approach toward regulating emissions from motor vehicles.

The Tier 3 standards include new light and heavy-duty vehicle emission standards for exhaust emissions of NMOG+NOx, PM, and evaporative emissions, to be phased in between model years 2017 (2018 for heavier vehicles) through 2025. The final standards are in most cases identical to those of California's LEV III program. The rule also required the reduction of gasoline sulfur content from 30 ppm average down to a 10 ppm average beginning in 2017. The reduction in average sulfur content of gasoline will optimize catalyst performance with two beneficial effects: 1) Vehicles designed to the Tier 3 tailpipe exhaust standards will be able to meet those standards in-use for the duration of their useful life, and 2) Immediate emission reductions will be realized from all the gasoline-fueled vehicles on the road at the time the new lower sulfur limits are implemented in 2017.

In the Tier 3 rule, EPA cited research studies that examined the effect of various gasoline sulfur levels on Tier 2 vehicles. The results indicated that reducing sulfur levels in gasoline from 30 ppm to 10 ppm could result in NOx reductions from Tier 2 vehicles of 12-27 percent, and hydrocarbon reductions of 11-13 percent. EPA also evaluated the national impact of the Tier 3 program using the MOVES model, finding a 10 percent reduction in national on-road NOx emissions in 2018 due to the program, with a 35 percent reduction in 2030. VOC emission reductions were estimated to be 3 percent in 2018 and 16 percent in 2030 for the national on-road inventory due to the Tier 3 requirements.

[25] 80 FR 13768
[26] 89 FR 57362
[27] 79 FR 23414

The Safer Affordable Fuel-Efficient (SAFE) Vehicles Rule for Model Years 2021–2026 Passenger Cars and Light Trucks

On April 30, 2020, the National Highway Traffic Safety Administration (NHTSA) and EPA published a final rule to amend and establish carbon dioxide (CO_2) standards for MY 2021 and later, as well as establish new fuel economy standards for MY 2022 through 2026.[28] The SAFE Vehicles Rule amends the Congressionally-mandated Corporate Average Fuel Economy (CAFE) and Light-Duty Vehicle Greenhouse Gas Emissions Standards, of which the NHTSA set and enforce, while EPA calculates average fuel economy standards and GHG emissions standards.

The rule applies to companies that manufacture or sell new light-duty trucks and vehicles, and medium-duty passenger vehicles, and aims to facilitate the ability of motor vehicle manufacturers to meet the requirements of the program under a single national program. The CAFE and CO_2 emission standards will increase at 1.5 percent each year in stringency from MY 2020 levels to MY 2021 through 2026. Both standards are vehicle-footprint-based standards and become more stringent every year from 2021 to 2026, when compared to MY 2020 standards. Using footprint-based standards assures that the burden of compliance is distributed across all vehicle manufacturers and footprints.

By MY 2030, EPA's standards are projected to require 201 grams per mile (g/mi) of CO_2 and NHTSA's standards are projected to require 40.5 miles per gallon (mpg). The agencies note that the CAFE and CO_2 compliance levels are often lower than the real-world CO_2, and usually higher than real-world fuel economy. A portion of EPA's expected CO_2 decreases will be achieved through improvements in air conditioner leakage and using alternative refrigerants.

Non-Road Compression Ignition (Diesel) Engines

Non-road engines are used in a variety of applications such as construction equipment, outdoor power equipment, farm equipment, lawn and garden equipment, marine vessels, locomotives, and aircraft. Prior to the mid-1990's, emissions from these engines were largely unregulated. EPA has since issued several rules regulating emissions from new and, in some cases, remanufactured non-road engines.[29] Major non-road emission control measures and fuel programs are summarized in Table 2-4 and accounted for in the emissions inventories used for this SIP revision. Older programs are included in the table because they continue to contribute to emission reductions through fleet turnover as owners replace older equipment with more recent model year equipment subject to tighter emission standards.

EPA rules have established four tiers of emission standards for new non-road diesel engines. EPA's first non-road regulations were finalized in 1994,[30] when Tier 1 emission standards were issued for most large, greater than 50 horsepower (hp), land-based non-road compression-ignition (CI, or diesel) engines used in applications such as agricultural and construction

[28] 85 FR 24174

[29] Tables of emission standards by engine type are posted by EPA at: https://www.epa.gov/regulations-emissions-vehicles- and-engines/regulations-emissions-non-road-vehicles-and-engines and https://www.epa.gov/emission-standards-reference-guide/epa-emission-standards-non-road-engines-and-vehicles.

[30] 59 FR 31306

equipment, which were phased in between 1996 and 2000.

In 1998, EPA promulgated Tier 1 standards for smaller (< 50 hp) diesel engines, including marine propulsion and auxiliary engines, which required phase-in between 1999 and 2000.[31] At the same time, EPA issued more stringent Tier 2 emission standards for all non-road diesel engine sizes to be phased in from 2001 to 2006 and Tier 3 standards requiring additional reductions from new diesel engines between 50 and 750 hp to be phased in from 2006 to 2008.
EPA finalized Tier 4 rules for non-road diesel engines in 2004. The rule integrated new diesel engine emission standards with fuel requirements. The emission standards applied to most construction, agricultural, industrial, and airport equipment, and were phased in between 2008 and 2015. The Tier 4 emission standards do not apply to diesel engines used in locomotives and marine vessels.

The rule also established a two-phase reduction in diesel fuel sulfur levels, limiting concentrations to 500 ppm in 2007 and 15 ppm in 2010 (2012 for locomotives and marine vessels). The lower sulfur diesel levels minimize damage to emission-control systems used to meet the Tier 4 engine exhaust standards.

Non-Road Spark Ignition (e.g., Gasoline) Engines

EPA rules regulate small (less than 25 hp) non-road spark-ignition (SI) engines (except marine and recreational engines) in two phases. EPA's Phase 1 standards for new small SI engines were issued in 1995.[32] These engines, which usually burn gasoline, are used primarily in lawn and garden equipment. The standards apply to model year 1997 and newer engines.

EPA subsequently issued more stringent Phase 2 emission standards for both small non-handheld engines (e.g., lawn mowers, generator sets, air compressors) and small handheld engines (e.g., leaf blowers, chain saws, augers) in 1999[33] and 2000,[34] respectively. Phase 2 standards were phased-in from 2001 to 2007 for non-handheld engines and from 2002 to 2007 for handheld engines.

EPA finalized emission standards for new gasoline spark-ignition marine engines in 1996[35] to be phased-in between 1998 and 2006. These engines, typically based on simple two-stroke technology, are used for outboard engines, personal watercraft, and jet boats.

EPA's 2002 rulemaking also included exhaust emission standards for non-road recreational spark-ignition engines and vehicles.[36] These recreational land-based engines are found in snowmobiles, off-highway motorcycles, and all-terrain-vehicles (ATVs). The standards were phased-in between 2006 and 2007, except for snowmobiles, which had until 2009 to comply. In addition, snowmobiles were subject to more stringent standards that became effective in 2010

[31] 63 FR 56968
[32] 60 FR 34582
[33] 64 FR 15208
[34] 65 FR 24268
[35] 61 FR 52088
[36] 67 FR 68242

and 2012. Plastic fuel tanks and rubber hoses available on recreational vehicles are also regulated for permeation, to minimize the fuel lost through the component walls. The permeation standards for fuel tanks and fuel hoses on recreational vehicles were effective in 2008.

In 2008, Phase 3 emission standards were issued for new marine SI engines and land-based SI at or below 19 kW, such as those used in lawn and garden equipment.[37] These new standards began in 2010 for new marine SI engines and in 2011 or 2012 for the land-based SI engines. EPA estimates that by 2030, this rule will decrease VOC emissions by 604,000 tons/year, NOx emissions by 132,200 tons/year, and PM2.5 emissions by 5,500 tons/year.

Marine Diesel Engines

Marine diesel engines include small auxiliary and propulsion engines, medium-sized propulsion engines on coastal and harbor vessels, and very large propulsion engines on ocean-going vessels. EPA published a final rule in 2002 that included new engine emission standards for recreational marine diesel engines.[38] These are marine diesel engines rated over 37 kW, or >50 hp, which are used in yachts, cruisers, and other types of pleasure craft. The standards were phased-in, beginning in 2006, depending on the size of the engine. By 2009, emission standards were in effect for all recreational, marine diesel engines.

[37] 73 FR 59034
[38] 67 FR 68242

Table 2-4. *Non-Road Mobile Sources Control Strategies.*

Non-Road Engine Category	Date of Final Rule	Implementation Phase-In (MY)
Compression Ignition (diesel) Engines		
Tier 1: Land-Based Diesel Engines > 50 hp	06/17/1994 (59 FR 31306)	1996-2000
Tier 1: Small Diesel Engines < 50 hp	10/23/1998 (63 FR 56968)	1999-2000
Tier 2: Diesel Engines (all sizes)		2001-2006
Tier 3: Diesel Engines 50 - 750 hp		2006-2008
Tier 4: All Diesel Engines (Except locomotive and marine vessels)	06/29/2004 (69 FR 38958)	2008-2015
Spark-Ignition (e.g., gasoline) Engines		
Phase 1: SI Engines < 25 hp (except marine & recreational)	07/03/1995 (60 FR 34582)	1997
Phase 2: Non-Handheld SI Engines < 25 hp	03/30/1999 (64 FR 15208)	2001-2007
Phase 2: Handheld SI < 25 hp	04/25/2000 (65 FR 24268)	2002-2007
Phase 3: SI Engines (including marine) < 19kW	10/08/2008 (73 FR 59034)	2010 - 2012
Gasoline SI Marine Engines (outboard & personal watercraft)	10/04/1996 (61 FR 52088)	1998-2006
Large Spark-Ignition Engines >19 kW (or >25 hp)	11/08/2002 (67 FR 68242)	2004 & 2007
Recreational Land-Based Spark-Ignition Engines		2006-2012
Marine Diesel Engines The Act to Prevent Pollution from Ships (APPS) implements the provisions of the International Convention for the Prevention of Pollution from Ships (MARPOL) Annex VI for the United States (33 U.S.C. 1901–1912)	2/19/2015 (80 FR 9078) More info: https://www.epa.gov/regulations-emissions-vehicles-and-engines/regulations-emissions-marine-vessels	US Emission Control Areas in effect: 2012 After-treatment NOx controls: 2016
Commercial Marine Diesel Engines[1] (US-flagged vessels)	12/29/1999 (64 FR 73300)	2004-2007
Recreational Marine Diesel Engines >37 kW (or >50 hp)	11/08/2002 (67 FR 68242)	2006-2009
Marine Diesel Engines (US-flagged vessels) >30 liters/cylinder	02/28/2003 (68 FR 9746) 04/30/2010 (75 FR 22896)	2004 2011-2016
Locomotive & Marine Diesel Rule (new & remanufactured) Amendments to Locomotive & Marine Diesel Rule	06/30/2008 (73 FR 37096) 10/02/2020 (85 FR 62218)	2009 -2015 2024 -2026
Spark-Ignition Engines/Equipment (marine & land engines)	10/08/2008 (73 FR 59034)	2010-2012
Locomotives New & Remanufactured Locomotives and Locomotive Engines[2]	04/16/1998 (63 FR 18978)	Tier 0: 1973-2001 Tier 1: 2002-2004 Tier 2: 2005 +
Locomotive & Marine Diesel Rule (new & remanufactured)	06/30/2008 (73 FR 37096)	2009-2015
Non-Road Diesel Fuel	06/29/2004 (69 FR 38958)	Phase 1: 2007 Phase 2: 2010 (2012 for Marine & Locomotive)

Aircraft		
Control of Air Pollution From Aircraft and Aircraft Engines 1	05/08/1997 (62 FR 25356)	1997
Control of Air Pollution From Aircraft and Aircraft Engines 2	11/17/2005 (70 FR 69664)	2005
Control of Air Pollution From Aircraft and Aircraft Engines 3	06/08/2012 (77 FR 36342)	2012 & 2014
Control of Air Pollution From Aircraft and Aircraft Engines 4	11/23/2022 (87 FR 72312)	2023 & 2028

[1] Only applies to commercial marine diesel engines with displacements under 30 liters per cylinder.

[2] EPA has established three sets of locomotive standards, applied based on the date the locomotive was first manufactured (i.e. during the Tier 0, Tier 1, or Tier 2 periods). The applicable standards take effect when the locomotive or locomotive engine is first manufactured and continue to apply at each periodic remanufacture.

On February 28, 2003, EPA finalized emission standards for exhaust emissions from U.S.-flagged vessels with new marine diesel engines rated over 37 kW with displacements over 30 liters per cylinder (also known as Category 3 Marine Diesel Engines).[39] This marks the first time that emissions from very large marine diesel engines have been regulated. These diesel engines are used primarily for propulsion power on ocean-going vessels such as container ships, tankers, bulk carriers, and cruise ships. Most Category 3 marine diesel engines are used for propulsion on vessels engaged in international trade.

Both new and modified marine diesel engines rated above 175 hp must adhere to international standards (i.e., MARPOL convention) if vessel construction or engine modification commences on or after January 1, 2000. U.S.-flagged commercial vessels with new marine diesel engines rated over 37 kW (or >50 hp, with displacements up to 30 liters per cylinder) produced after 2003 (after 2006 for very large engines) were required to comply with EPA standards issued in 1999.[40] In October 2008, the member states of the International Maritime Organization agreed to amend MARPOL Annex VI, adopting new tiers of NOx and fuel sulfur controls. The most stringent of these new emission standards apply to ships operating in designated areas, including the newly designated North American Emission Control Area, which was officially recognized in 2012. The Tier III standards for NOx, which become effective in 2016 along the US East Coast, are 80 percent lower than Tier I standards.

In 2008, EPA finalized the Marine Diesel Rule creating exhaust emission standards for marine spark-ignition engines (more stringent than those finalized on October 4, 1996[41]) and small land-based non-road spark-ignition engines.[42] The rule also included new evaporative emission standards for equipment and vessels using these engines. The marine spark-ignition engines and vessels affected by these standards, effective starting with the 2010 model year, include outboard engines and personal watercraft, as well as sterndrive and inboard engines. The small non-road spark-ignition engines and equipment affected by these standards, effective starting with the 2011 and 2012 model year, are those rated below 25 hp (19 kW) used in household and commercial applications, including lawn and garden equipment, utility vehicles, generators, and a variety of other construction, farm, and industrial equipment.

Locomotives

States are generally preempted from adopting standards to control emissions from locomotives. As such, Connecticut depends on EPA to establish standards. EPA established emission standards for new and remanufactured locomotives and locomotive engines in 1998.[43] At that time, three sets of standards were adopted, with applicability of the standards tied to the date a locomotive is first manufactured (i.e., 1973 through 2001, 2002 to 2004, and 2005 and later). In June 2008, EPA finalized additional standards to reduce emissions of PM and NOx from

[39] 68 FR 9746
[40] 61 FR 73300
[41] 61 FR 52088
[42] 73 FR 59034
[43] 63 FR 18978

locomotives and marine vehicles.[44] The 2008 rule established short term Tier 3 standards and longer-term Tier 4 standards for new locomotives as well as established idling restrictions.

The remanufacturing standards do not apply to the existing fleets of locomotives owned by very small railroads, such as those which comprise the bulk of the fleet in Connecticut. The second part established near term engine-out (Tier 3) emission standards for new locomotives and marine diesel engines, phased-in starting in 2009. The third part of the program entailed setting longer-term (Tier 4) emission standards for newly-built locomotives and marine diesel engines that reflect the application of high-efficiency emission control technology. The Tier 4 emission standards began to be phased-in starting in 2014 for marine diesel engines and 2015 for locomotives (these standards are enabled due to the availability of diesel fuel capped at 15 ppm sulfur content in 2012). All new marine diesel engines with displacements less than 30 liters per cylinder (Category 1 and Category 2 engines greater than 50 hp) vessels are covered in this rulemaking.

In order to accelerate the phase-in of cleaner locomotives, CARB recently adopted the *In-Use Locomotive Regulation* aimed at forcing diesel fueled locomotives to cease operation and increasing the use of zero emission locomotives by 2030.[45] If California's In-Use Locomotive Regulation is approved by EPA for implementation, DEEP intends to evaluate the feasibility of such a rule in Connecticut. Connecticut has already electrified much of its commuter rail and CTDOT's Connecticut State Rail Plan (2022-2026) has among its objectives the electrification of all commuter rails. The plan also has goals for improved service to increase rail ridership and freight capacity in order to reduce VMT and the use of less efficient automobiles and trucks.

Aircraft

States are preempted from adopting standards to control emissions from aircraft. As such, Connecticut depends on EPA to establish standards. Control of air pollution from aircraft and aircraft engines was first regulated by EPA in a 1997 rulemaking.[46] That rule adopted the international aircraft emissions standards of the United Nations International Civil Aviation Organization (ICAO), which had been in place since 1986 and amended in 1993. The rule brought U.S. aircraft standards into alignment with international standards and applied to newly manufactured and newly certified commercial aircraft gas turbine engines with rated thrust greater than 26.7 kilonewtons (kN). ICAO adopted revised standards in 1999 for implementation beginning in 2004. In November of 2005, EPA finalized the adoption of the revised ICAO standards, to bring U.S. aircraft standards once again into alignment with international standards.[47]

In June 2012, EPA adopted additional measures to establish Tier 6 and Tier 8 aircraft standards,

[44] 73 FR 37096
[45] https://theicct.org/publication/californias-in-use-locomotive-regulation-jul23/#:~:text=The%20In%2Duse%20Locomotive%20Regulation,before%20it%20can%20be%20implemented.
[46] 62 FR 25356
[47] 70 FR 69664

both designed to further reduce NOx emissions.[48] The Tier 6 standards applied to engines until December 31, 2013, and the Tier 8 standards apply to engines being manufactures since January 1, 2014.

In November 2022, EPA issued a final rule regulating PM emission standards that mirror the ICAO standards that cover subsonic turbofan and turbojet engines with rated outputs of greater than 26.7 kN.[49]

Stationary and Area Source Control Measures

Several existing and proposed federal and state rules serve to reduce ozone precursor emissions from stationary and area sources in Connecticut (and upwind states) in the post-2017 period. These measures contribute to meeting RFP requirements and achieving attainment of the ozone NAAQS in Connecticut. Table 2-5 summarizes federal stationary and area source measures, along with the effective date of the rules and the initial date when emission reductions are required.

Some of the federal rules, such as the Revised Cross-State Air Pollution Rule (CSAPR) Update and the final Good Neighbor Plan for the 2015 Ozone NAAQS, directly limit emissions of NOx during the ozone season in states located upwind of Connecticut. Other rules, such as the Reciprocating Internal Combustion Engine (RICE) National Emission Standards for Hazardous Air Pollutants (NESHAP) rule, the Industrial/Commercial/Institutional (ICI) Boiler Maximum Achievable Control Technology (MACT) rule, and the Mercury and Air Toxics (MATS) rule, may not specifically require limitations on ozone precursor emissions, but are projected by EPA to indirectly reduce ozone precursor emissions in Connecticut and upwind states.[50] Small, indirect reductions are anticipated to occur as a co-benefit of regulation of another pollutant (e.g., by motivating changes in equipment or fuels used, work practices, or increased use of renewable generating capacity).

[48] 77 FR 36342
[49] 87 FR 72312
[50] See: "Technical Support Document (TSD) Preparation of Emissions Inventories for the 2016v1 North American Emissions Modeling Platform", EPA OAQPS; March 2021

Table 2-5. *Federal Stationary and Area Source Measures Expected to Provide Ozone Precursor Emission Reductions.*

Federal Control Measures	Affected Ozone Precursor Pollutant(s)	Date of Federal Rule Promulgation	Date when Emission Reductions Begin
Good Neighbor Plan for the 2015 Ozone NAAQS*	NOx	06/05/2023 (88 FR 36654)	2023
RICE NESHAP	NOx, VOC	08/10/2022 (87 FR 48603) 01/30/2013 (78 FR 6674) 8/10/2010 (75 FR 51570)	2013
ICI Boiler & Process Heater MACT & Amendments	VOC	10/06/2022 (87 FR 60816) 11/20/2015 (80 FR 72790) 03/21/2011 (76 FR 15608 and 76 FR 15554)	2023 2013 2014 & 2012+
Mercury & Air Toxics Standards	NOx	04/15/2020 (85 FR 20838) 04/14/2016 (81 FR 24420) 12/16/2011 (77 FR 9304)	2020 2015
Portable Fuel Container Rule (part of Mobile Source Air Toxics rule)	VOC	EPA 02/26/2007 rule (72 FR 8428) enabled CT to revoke equivalent 2007 state rule (RCSA 22a-174-43)	2007-2017 (turnover period)

* The Good Neighbor Rule for the 2015 Ozone NAAQS became final in June 2023 to ensure that the 26 states included in the CAA "Good Neighbor" requirements reduce pollution that contributes significantly to downwind states. For the first time, the rulemaking included reductions from EGU and non-EGU sources. Connecticut was not cited by EPA as a significantly contributing state and is therefore not included in the program; however, emission reductions required in upwind states were projected by EPA to provide small ozone air quality improvements (0.5 ppb or less) at Connecticut monitors.

On an ongoing basis, DEEP evaluates and adopts control measures that reduce NOx and VOC emissions from Connecticut sources to reduce in-state impacts and to minimize impacts on downwind areas in other states. EPA has issued a large number of Control Techniques Guidelines (CTGs) and Alternate Control Technique (ACT) documents with recommendations on how to control VOC emissions from a variety of source categories. The CTG/ACTs are intended to assist states with the development of RACT regulations. Many control measures described in the tables below were identified as satisfying requirements for Connecticut's multiple RACT reviews for the 2008 and 2015 ozone NAAQS as required by CAA sections 182(b) and 184(b).[51]

[51] See DEEP's webpage for update to CT's RACT program: https://portal.ct.gov/DEEP/Air/Planning/SIP/Air-SIP-Revisions--Other-State-Plans-for-Control-of-Air-Pollution

Table 2-6. *Connecticut's CTG/ACT-Based VOC Control Measures Enacted Since 2011.*

Control Measure	Pollutant	Section of the Regulations of Connecticut State Agencies	Status of Regulation Adoption	Date Applies to Create Emissions Reductions	CTG or ACT issued for the source category regulated by the control measure
Metal furniture coating	VOC	22a-174-20(p)	4/6/2010	1/1/2011	CTG for Metal Furniture Coatings (2007)
Paper, film and foil coating	VOC	22a-174-20(q)	4/6/2010	1/1/2011	CTG for Paper, Film and Foil Coatings (2007)
Flexible package printing	VOC	22a-174-20(ff)	4/6/2010	1/1/2011	CTG for Flexible Package Printing (2006)
Offset lithographic and letter press printing	VOC	22a-174-20(gg)	4/6/2010	1/1/2011	CTG for Offset Lithographic Printing and Letterpress Printing (2006)
Large appliance coatings	VOC	22a-174-20(hh)	4/6/2010	1/1/2011	CTG for Large Appliance Coatings (2007)
Industrial solvent cleaning	VOC	22a-174-20(ii)	4/6/2010	1/1/2011	CTG for Industrial Cleaning Solvents (2006)
Spray application equipment cleaning	VOC	22a-174-20(jj)	4/6/2010	1/1/2011	State-specific requirements. In the absence of RCSA section 22a-174- 20(jj), spray gun cleaning would be addressed via the industrial solvent cleaning requirements (RCSA section 22a-174-20(ii)) adopted pursuant to the CTG for Industrial Cleaning Solvents (2006).
VOC emissions from miscellaneous metal and plastic parts coating	VOC	22a-174-20(s)	10/31/2012	1/1/2013	CTG for Miscellaneous Metal and Plastic Parts Coatings (2008)
VOC emissions from pleasure craft coating	VOC	22a-174-20(kk)	10/31/2012	1/1/2013	CTG for Miscellaneous Metal and Plastic Parts Coatings (2008)
Control of VOC emissions from above- ground storage tanks	VOC	22a-174-20(a)	3/7/2014	6/1/2014	Alternative Control Techniques Document – Volatile Organic Liquid Storage in Floating and Fixed Roof Tanks (1994) Control of Volatile Organic Emissions from Petroleum Liquid Storage in External Floating Roof Tanks (1978) Control of Volatile Organic Emissions from Storage of Petroleum Liquids in Fixed Roof Tanks (1977)

VOC emissions from transfer and dispensing of gasoline	VOC	22a-174-20(a), 22a-174-30a	7/8/2015	7/1/2015 -- CARB-approved P/V vent valves 7/8/2015 -- Annual pressure decay test	Design Criteria for Stage I Vapor Control Systems – Gasoline Service Stations (1975)
Oil and Natural Gas Industry	VOC	Not applicable – CT certifies that no sources meeting the description of this CTG category are operating within the state	Not applicable	Not applicable	CTG for the Oil and Natural Gas Industry (2016)

Table 2-6 lists CTG/ACTs which have been adopted into Connecticut's SIP, along with the date on which the requirement was adopted in Connecticut and the date on which compliance was required so that the control measure began to reduce VOC emissions. The CTG or ACT upon which each control measure is based (or that applies to the same source category as is regulated by the control measure) is also identified.

In addition to the CTG/ACT measures just described, DEEP recently adopted six additional control measures to further reduce NOx or VOC emissions from Connecticut stationary and area sources. Table 2-7 identifies these measures, the relevant statute or regulation, the adoption status, and the anticipated effective and compliance dates.

As part of regional haze planning obligations, Connecticut and other northeast states revised state statutes and regulations to reduce the level of sulfur allowed in distillate and residual fuel oil to help reduce regional sulfate levels. Studies found that lower levels of sulfur in distillate oil also result in reductions in NOx emissions from stationary combustion sources. As part of a MARAMA inventory effort, states examined the available literature and conservatively estimated that reducing distillate sulfur content from 3000 ppm to 500 ppm (Connecticut's Phase 1 limit, which began in July 2014) reduced NOx emissions from boilers and process heaters by seven percent.[52] Connecticut's Phase 2 limit of 15 ppm began in July 2018 and improves air quality over the baseline year and beyond.

Revisions to Connecticut's municipal waste combustor (MWC) regulation were finalized in August 2016 and became effective in August 2017. Statewide NOx emission reductions of 658 tons per year (tpy) result from the revised MWC rule. Those reductions will help to further improve ozone air quality in 2018 and beyond.

[52] "Technical Support Document: Emission Inventory Development for 2011, 2018, and 2028 for the Northeastern U.S. Beta2 Version"; MARAMA; July 12, 2017. See page 63 for a discussion of NOx emission reductions associated with low-sulfur fuel oil. The MARAMA TSD refers to a Technical Memorandum prepared by NYDEC dated April 15, 2016 for documentation on the level of NOx reductions.

In 2016, DEEP finalized adoption of two measures targeted at major (RCSA 22a-174-22e) and non-major (RCSA 22a-174-22f) NOx sources. Phase 1 NOx standards of RCSA 22a-174-22e were implemented on June 1, 2018. More stringent Phase 2 standards began on June 1, 2023. Any alternative compliance options expire as of May 1, 2028, requiring all equipment operating under a compliance option to meet the applicable Phase 2 standard or shutdown. The standards in RCSA section 22a-174-22e compare favorably with the NOx emission limits required in other states for all categories of fuel-burning equipment.

The final two VOC measures identified in Table 2-7 are updates to Connecticut's regulations to further reduce emissions from consumer products (RCSA 22a-174-40) and architectural and industrial maintenance (AIM) coatings (RCSA 22-174-41).

Many of the control measures mentioned above are further described in the RACT SIP that DEEP submitted to EPA in 2020 for the 2008 ozone NAAQS. Background information concerning the amendment of RCSA section 22a-174-38 for MWCs and the adoption of RCSA sections 22a-174-22e and 22a-174-22f is available on DEEP's RACT webpage.

Table 2-7. *Connecticut's Non-CTG Controls for Ozone Precursor Emissions from Stationary and Area Sources.*

Control Measure	Pollutant	Section of the Regulations of Connecticut State Agencies or Connecticut General Statutes	Status of Regulation Adoption	Date Requirements Apply to Create Emissions Reductions
Fuel oil sulfur limits for #2 distillate/heating oil and #4/#6 residual oil that indirectly reduce NOx emissions	NOx	22a-174-19, 22a-174-19a, 22a-174-19b, CGS 16a-21a	RCSA 22a-174-19, 19a & 19b: Revised 04/15/2014 and approved by EPA on 05/06/2016 (81 FR 33134), with subsequent revisions submitted 06/08/2015 & 09/28/2015. CGS 16a-21a: Revised July 2015.	Phase 1: 7/1/2014 Phase 2: 7/1/2018
Reduction in emission limit for mass burn waterwall municipal waste combustors	NOx	22a-174-38	Adoption complete: 08/02/2016. SIP Revision submitted 09/16/2016. EPA SIP approval 07/31/2017. (80 FR 13768)	Revised emission limits become effective 8/2/2017.
Control of NOx emissions from fuel-burning equipment at major stationary sources of NOx	NOx	22a-174-22e (one of two regulations to replace 22a-174-22)	Adoption complete: 12/22/2016. SIP Revision submitted 01/24/2017. EPA SIP approval 07/31/2017. (82 FR 35454) Amended 10/08/2019 EPA SIP approval 07/14/2021 (86 FR 37053)	Phase 1 emission limits: June 1, 2018. Phase 2 emission limits: June 1, 2023. Unless otherwise specified in permit or order, end of compliance options and case-by-case RACT limits: May 1, 2028.
High daily NOx emitting units at non-major sources of NOx	NOx	22a-174-22f (one of two regulations to replace 22a-174-22)	Adoption complete: 12/22/2016. SIP Revision submitted 01/24/2017. EPA SIP approval 07/31/2017. (82 FR 35454).	May 1, 2018.
Reduction in VOC content limits for consumer products	VOC	22a-174-40	Adoption complete: 10/05/2017 EPA SIP Approval 11/19/2018 (83 FR 28188)	May 1, 2018
Reduction in VOC content limits for architectural and industrial maintenance coatings	VOC	22a-174-41, 22a-174-41a	Adoption complete: 10/05/2017 EPA SIP Approval 11/19/2018 (83 FR 28188)	May 1, 2018

2.3 Future Year Emission Projections

EPA's Implementation Rule for the 2015 ozone NAAQS requires moderate nonattainment areas to demonstrate RFP towards attainment by achieving at least a 15 percent reduction in ozone precursor emissions between 2017 and 2023. The rule requires that ozone season day emissions be used for the RFP demonstration and should represent the conditions that led to a nonattainment designation. DEEP has prepared a projected future year ozone season day inventory for 2023 to assess whether the 15 percent RFP requirement has been satisfied and to also meet the requirement to submit an inventory for the required attainment year. Emissions projections were developed from the 2017 Base Year Inventory (see Section 2.1) by using appropriate methods to account for expected changes in activity (i.e., growth) and emission controls during the 2017 through 2023 period for each source category.

The following subsections describe the selection of growth factors for each source category, estimated reductions from the controls described in Section 2.2, and the resulting future year emission projections for 2023.

Growth and Control Methodologies Used to Project 2023 Emissions

As described in Section 2.1, the 2017 Base Year Inventory to be used for the RFP demonstration was developed from the 2017 NEI for the point source, area source, and non-road source categories. On-road emissions estimates for 2017 were consistent with the motor vehicle emissions budgets (MVEBs) approved by EPA with Connecticut's SIP submittal for the 2008 ozone NAAQS in 2018 (83 FR 49297). See Section 2.1 for a more complete explanation of modifications made to the 2017 NEI.

Emissions projections for 2023 were developed from the 2017 Base Year Inventory by accounting for changes in activity (i.e., growth) and post-2017 controls for the various anthropogenic source categories. Table 2-8 below, which was taken from Section 4 of EPA's *Technical Support Document (TSD): Preparation of Emissions Inventories for the 2016v3 North American Emissions Modeling Platform,*[53] summarizes methodologies used for projecting each source sector.

In general, projections relied on various datasets collected from state, local, or tribal agencies, sources such as the Annual Energy Outlook (AEO) 2022, EPA reports, or Environmental Impact Assessments (EIA) and include data from different rules or regulations such as the Revised CSAPR Update.

[53] https://www.epa.gov/system/files/documents/2023-03/2016v3_EmisMod_TSD_January2023_1.pdf

Table 2-8. *Overview of Projection Methods for the Future Year Cases.*

Platform Sector: *abbreviation*	Description of Projection Methods for Analytic Year Inventories
EGU units: *ptegu*	The Integrated Planning Model (IPM) outputs from the Updated Summer 2021 version of the IPM platform were used. For 2023, the 2023 IPM output year was used and for 2026 the 2025 output year was used. Emission inventory Flat Files for input to SMOKE were generated using post-processed IPM output data. **A list of included rules is provided in Section 4.1**.
Point source oil and gas: *pt_oilgas*	First, known closures were applied to the 2016 pt_oilgas sources. Production-related sources were then grown from 2016 to 2021 using historic production data. The production-related sources were then grown to 2023 and 2026 based on growth factors derived from the Annual Energy Outlook (AEO) 2022 data for oil, natural gas, or a combination thereof. The grown emissions were then controlled to account for the impacts of New Source Performance Standards (NSPS) for oil and gas sources, process heaters, natural gas turbines, and reciprocating internal combustion engines (RICE). Some sources were held at 2018 or 2019 levels. WRAP future year inventories are used in all of the WRAP states except for New Mexico (CO, MT, ND, SD, UT and WY). The future year WRAP inventories are the same for all analytic years. New Mexico emissions are projected from 2016 along with the non-WRAP states.
Airports: *airports*	Point source airport emissions were grown from 2016 to each analytic year using factors derived from the 2021 Terminal Area Forecast (TAF) released in June 2022 (see https://www.faa.gov/data_research/aviation/taf/). Corrections to emissions for ATL from the state of Georgia are included, as well as some corrections for specific airports in the state of Texas.
Remaining non-EGU point: *ptnonipm*	2019 NEI data (EPA, 2022) were used for 2023 for most sources. Known closures were applied to ptnonipm sources. Closures were obtained from the Emission Inventory System (EIS) and also submitted by the states of Alabama, North Carolina, Ohio, Pennsylvania, and Virginia. Industrial emissions were grown according to factors derived from AEO2022 to reflect growth from 2023 onward. Rail yard emissions were grown using the same factors as line haul locomotives in the rail sector. Controls were applied to account for relevant NSPS for RICE, gas turbines, refineries (subpart Ja), and process heaters. The Boiler MACT is assumed to be fully implemented in 2016 except for North Carolina. Controls are reflected for the regional haze program in Arizona. Changes to ethanol plants and biorefineries are included. In 2016v3, additional closures were implemented, new sources were added based on 2019 NEI, and growth in MARAMA states was updated using MARAMA spreadsheets after incorporating AEO 2022 data. Railyards in California were updated with CARB data for 2023 and 2026. Point source solvents are based on 2019 NEI and projected to 2023 and 2026.
Category 1, 2 CMV: *cmv_c1c2*	Category 1 and category 2 (C1C2) CMV emissions sources outside of California were projected to 2023 and 2026 based on factors from the Regulatory Impact Analysis (RIA) Control of Emissions of Air Pollution from Locomotive Engines and Marine Compression Ignition Engines Less than 30 Liters per Cylinder. California emissions were projected based on factors provided by the state. Projection factors for Canada for 2026 were based on ECCC-provided 2023 and 2028 data interpolated to 2026. The 2023 and 2026 emissions are unchanged from 2016v2 except for the improved spatial allocation to counties.

Category 3 CMV: *cmv_c3*	Category 3 (C3) CMV emissions were projected to 2023 and 2026 using an EPA report on projected bunker fuel demand that projects fuel consumption by region out to the year 2026. Bunker fuel usage was used as a surrogate for marine vessel activity. Factors based on the report were used for all pollutants except NOx. The NOx growth rates from the EPA C3 Regulatory Impact Assessment (RIA) were refactored to use the new bunker fuel usage growth rates. Assumptions of changes in fleet composition and emissions rates from the C3 RIA were preserved and applied to bunker fuel demand growth rates for 2023 and 2026 to arrive at the final growth rates. Projection factors for Canada for 2026 were based on ECCC-provided 2023 and 2028 data interpolated to 2026. The 2023 and 2026 emissions are unchanged from 2016v2 except for the improved spatial allocation to counties.
Locomotives: *rail*	Passenger and freight locomotives were projected using separate factors. Freight emissions were computed for analytic years based on fuel use values for 2023 and 2026. Specifically, they were based on AEO2019 and 2020 freight rail energy use growth rate projections along with emission factors based on historic emissions trends that reflect the rate of market penetration of new locomotive engines.
Area fugitive dust: *afdust, afdust_ak*	Paved road dust was grown to 2023 and 2026 levels based on the growth in VMT from 2016. The remainder of the sector including building construction, road construction, agricultural dust, and unpaved road dust was held constant at 2016 levels, except in the MARAMA region and NC where some factors were provided for categories other than paved roads. The projected emissions were reduced during modeling (as they are for the base year) according to a transport fraction computed using a new method for the 2016 beta platform and a meteorology-based zero-out that accounts for precipitation and snow/ice cover.
Livestock: *livestock*	Livestock were projected to 2023 and 2026 based on factors created from USDA National livestock inventory projections published in 2022(https://www.ers.usda.gov/publications/pub-details/?pubid=92599). NC and NJ projections were state provided.
Nonpoint source oil and gas: *np_oilgas*	Exploration-related sources were based on an average of 2017 through 2019 exploration data with NSPS controls applied, where applicable. Production-related emissions were initially projected to 2021 using historical data and then grown to 2023 and 2026 based on factors generated from AEO2022 reference case. Based on the SCC, factors related to oil, gas, or combined growth were used. Coalbed methane SCCs were projected independently. Controls were then applied to account for NSPS for oil and gas and RICE. WRAP future year inventories are used in seven WRAP states for 2023 and 2026 (except for NM, which is projected based on AEO).
Residential Wood Combustion: *rwc*	The 2016v3 emissions are the same as 2016v2, with the exception of Idaho, which uses the 2017 NEI for the base year emissions. RWC emissions were projected from 2016 to 2023 and 2026 based on growth and control assumptions compatible with EPA's 2011v6.3 platform, which accounts for growth, retirements, and NSPS, although implemented in the Mid-Atlantic Regional Air Management Association (MARAMA)'s growth tool. Factors provided by North Carolina were used for that state. RWC emissions in California, Oregon, and Washington were held constant at 2017 levels.
Solvents: *solvents*	Solvents are based on an updated method for 2016v3. The same projection and control factors were applied to solvent emissions as if these SCCs were in nonpt. Additional SCCs in the new inventory that correlate with human population were also projected. Solvent emissions associated with oil and gas activity were projected using the same projection factors as the oil and gas sectors. The 2016v1 NC and NJ nonpoint packets were used for 2023 and interpolated to 2026, and updated to apply to more SCCs. OTC controls for solvents were applied – both DE and NY provided new controls.

Remaining nonpoint: *nonpt*	Industrial emissions were grown according to factors derived from AEO2022 to reflect growth from 2021 onward. Data from earlier AEOs were used to derive factors for 2016 through 2021. Portions of the nonpt sector were grown using factors based on expected growth in human population. The MARAMA projection tool was used to project emissions to 2023 and 2026 after the AEO-based factors were updated to AEO2022. Factors provided by North Carolina and New Jersey were preserved. Controls were applied to reflect relevant NSPS rules (i.e., reciprocating internal combustion engines (RICE), natural gas turbines, and process heaters). Emissions were also reduced in 2016v2 and v3 to account for fuel sulfur rules in the mid-Atlantic and northeast not fully implemented by 2017. OTC controls for PFCs are included.
Nonroad: *nonroad*	Outside California and Texas and Texas, the MOVES3 model was run to create nonroad emissions for 2023 and 2026. The fuels used are specific to the analytic year, but the meteorological data represented the year 2016. EPA received new CARB data for analytic years for 2016v3. Texas nonroad emissions were provided by TCEQ for 2023 and 2028, and interpolated to 2026.
Onroad: *onroad, onroad_nonconus*	Activity data for 2016 were backcast from the 2017 NEI then projected from 2016 to 2019 based on trends in FHWA VM-2 trends. Activity data were held flat from 2019 to 2021, and then projected from 2021 to 2023 and 2026 using factors derived from AEO2022. Where S/Ls provided activity data for 2023, those data were used. To create the emission factors, MOVES3 was run for the years 2023 and 2026 using 2016 meteorological data and fuels, but with age distributions projected to represent the analytic years and the remaining inputs consistent with those used in 2017. The analytic year activity data and emission factors were then combined using SMOKE-MOVES to produce the 2023 and 2026 emissions. Inspection and maintenance updates were included for NC and TN (this changed the representative county groupings for analytic years). Section 4.3.2 describes the applicable rules that were considered when projecting onroad emissions.
Onroad California: *onroad_ca_adj*	CARB-provided emissions were used for California, but temporally allocated using MOVES3-based data. The 2016v3 platform uses new onroad emissions data provided by CARB for 2023 and 2026.
Other Area Fugitive dust sources not from the NEI: *othafdust*	Othafdust emissions for the analytic years were provided by ECCC in 2016v1. Projection factors were derived from those 2023 and 2028 inventories and applied to the 2016v2 inventory. 2026 projection factors were interpolated from 2023 and 2028. No changes were made to 2023 or 2026 othafdust emissions in 2016v3. Mexico emissions are not included in this sector.
Other Point Fugitive dust sources not from the NEI: *othptdust*	Wind erosion emissions were removed from the point fugitive dust inventories. Base year 2016 inventories with the rotated grid pattern removed were held flat for the analytic years, including the same transport fraction as the base year and the meteorology-based (precipitation and snow/ice cover) zero-out. No changes were made to 2023 or 2026 othptdust emissions between 2016v2 and 2016v3.
Other point sources not from the NEI: *othpt*	Canada emissions for analytic years were provided by ECCC for use in 2016v1. Projection factors were derived from those 2023 and 2028 inventories and applied to the 2016v2 inventory. 2026 projection factors were interpolated from 2023 and 2028. No changes were made to othpt emissions between 2016v2 and 2016v3. Canada projections were applied by province-subclass where possible (i.e., where subclasses did not change from between platforms). For inventories where that was not possible, including airports and most stationary point sources except for oil and gas, projections were applied by province. For Mexico sources, Mexico's 2016 inventory was grown using to the analytic years 2023 and 2026, using state+pollutant factors based on the 2016v1 platform inventories.

Mobile Sources

The majority of anthropogenic NOx and VOC emissions from Connecticut sources are emitted by on-road and non-road mobile sources. Non-road and on-road emissions were calculated using the MOVES3 model. As was previously described in Section 2.1, DEEP used data from CTDOT's most recent Ozone Air Quality Conformity Determination to estimate ozone season day emissions for on-road motor vehicles for both 2017 and 2023.

CTDOT provided county-level projections of various traffic data required by the MOVES3 model for 2023. Vehicle miles traveled (VMT) were estimated using CTDOT's Cube Series 2, which is a statewide network-based travel demand model. The MOVES runs for 2023 include appropriate inputs to reflect Connecticut's LEV III program and EPA's federal Tier 3 vehicle and fuel standards, in addition to all the control programs modeled to estimate 2017 emissions. See Section 2.2 (and Table 2-3) for a full description of modeled emission control programs for on-road vehicles.

Area and non-EGU Point Sources

The Control Strategy Tool (CoST) was used to produce future year area and non-EGU point source inventories. CoST creates future year inventories for each emissions modeling sector through applying control strategy, growth factor, and closure information developed into packets applicable sectors in the 2016 base year inventory.

For area and non-EGU point sources, CoST uses facility, unit, and stack-level closure information derived from a report from the Emissions Inventory System (EIS). Information from states regarding additional closures or closures that did not happen was also included in the data package.

Growth factors used for the area and non-EGU point sectors were based on a variety of indicators as surrogates for future sector activity including economic, energy, vehicle miles traveled, and demographic parameters. While recognizing that these surrogates may not track exactly with emissions, they are considered to be the "best available" data for projecting emissions for area and non-EGU point sources. Growth indicators were mapped to specific source classification codes.

The 2016v3 modeling platform relied on spreadsheets provided by the Mid-Atlantic Regional Air Management Association (MARAMA) of projection factors that included data from Annual Energy Outlook (AEO) 2022 and other similar surrogate data. Additional nonpoint sources such as fugitive dust growth, solvents, non-IPM point sources, and nonpoint sources also used data from MARAMA spreadsheets. MARAMA also provided EPA with data regarding reductions from fuel sulfur rules.

EGU Point Sources

The 2023 EGU point source emissions inventory was developed using the updated Summer 2021 Reference Case run of the Integrated Planning Model (IPM). IPM is a linear programming model that uses information such as energy demand, planned unit retirements, and planned rules to model unit-level energy production.

Large EGUs are associated with base year hourly NOx and SO2 Continuous Emissions Monitoring System (CEMS) data. Operational data was obtained from the National Electric Energy Data System (NEEDS). These base year values are then projected to match total seasonal emissions values in future years. EPA's 2016v3 inventory projects the EGU sector in Connecticut to have total NOx emissions of 2,772 tons in 2023.

Emission Projections for 2023

The resulting 2023 inventory, projected from 2016v3, is summarized at EPA's website for the 2023gf inventory. Ozone season day emissions were determined using the same method applied to the base year emissions as described in Section 2.1. The 2023 projections include the effects of the control measures described in Section 2.2 and are summarized in Table 2-3 through Table 2-7. Emission estimates for 2023 are summarized in Table 2-9 for Southwest Connecticut and in Table 2-10 for Greater Connecticut.

Table 2-9. *Summary of Southwest Connecticut Anthropogenic NOx and VOC Emissions for 2023 Ozone Season Day.*

Source Category	Ozone Season Day NOx (tons/ozone season day)	Ozone Season Day VOC (tons/ozone season day)
Stationary Point	6.5	1.7
Stationary Area	10.0	37.4
On-Road Mobile	18.6	15.3
Non-Road Mobile	11.8	15.1
Total Anthropogenic	46.9	69.6

Source: Estimates of 2023 emissions are based on EPA's 2023 inventory except for on-road mobile emissions which are from CTDOT's Air Quality Conformity Determination.

Table 2-10. *Summary of Greater Connecticut Anthropogenic NOx and VOC Emissions for 2023 Ozone Season Day.*

Source Category	Ozone Season Day NOx (tons/ozone season day)	Ozone Season Day VOC (tons/ozone season day)
Stationary Point	7.0	1.8
Stationary Area	9.6	37.5
On-Road Mobile	16.3	13.6
Non-Road Mobile	8.5	12.2
Total Anthropogenic	41.3	65.0

Source: Estimates of 2023 emissions are based on EPA's 2023 inventory except for on-road mobile emissions which are from CTDOT's Air Quality Conformity Determination.

Figure 2-8 provides a comparison of the base and future year emissions for the Southwest Connecticut area. Both VOC and NOx emissions are projected to decrease in Southwest Connecticut over the six-year period from 2017 to 2023. Anthropogenic VOC emissions are projected to decrease by 14 percent, after accounting for growth. Anthropogenic NOx emission reductions are projected to be even greater, with estimated reductions of 23 percent between 2017 and 2023, after accounting for growth. Large reductions are expected in the non-road (18 percent for VOC and 21 percent for NOx) and on-road (13 percent for VOC and 24 percent for NOx) sectors, as older vehicles and equipment are replaced by newer models. Large reductions are also projected for stationary area sources, with a 12 percent reduction of VOC and a 4 percent reduction in NOx. Stationary point sources are the only source category with projected VOC emissions that increase slightly in 2023 (6 percent increase).

Figure 2-8. *Comparison of 2017 and 2023 VOC and NOx Emissions for Southwest Connecticut.*

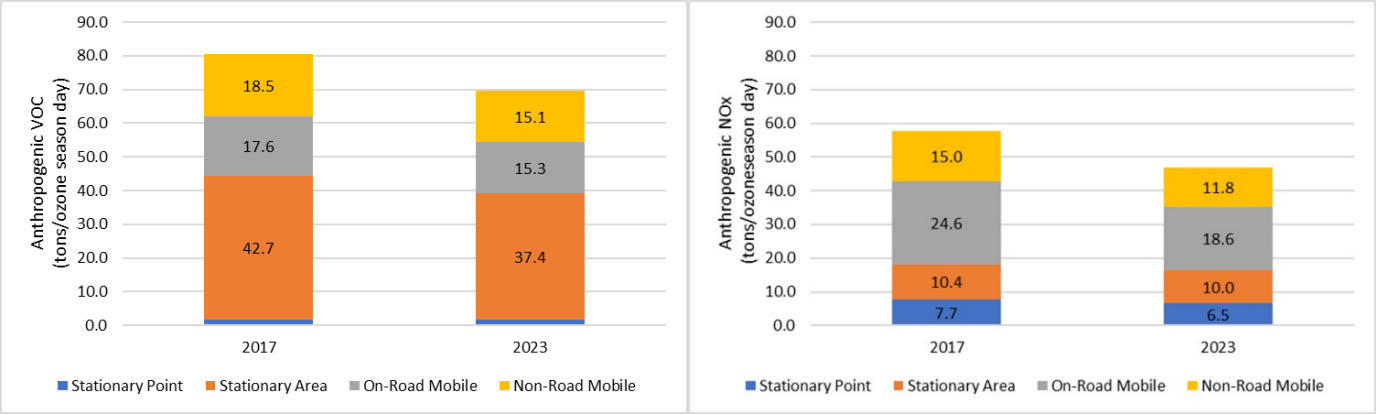
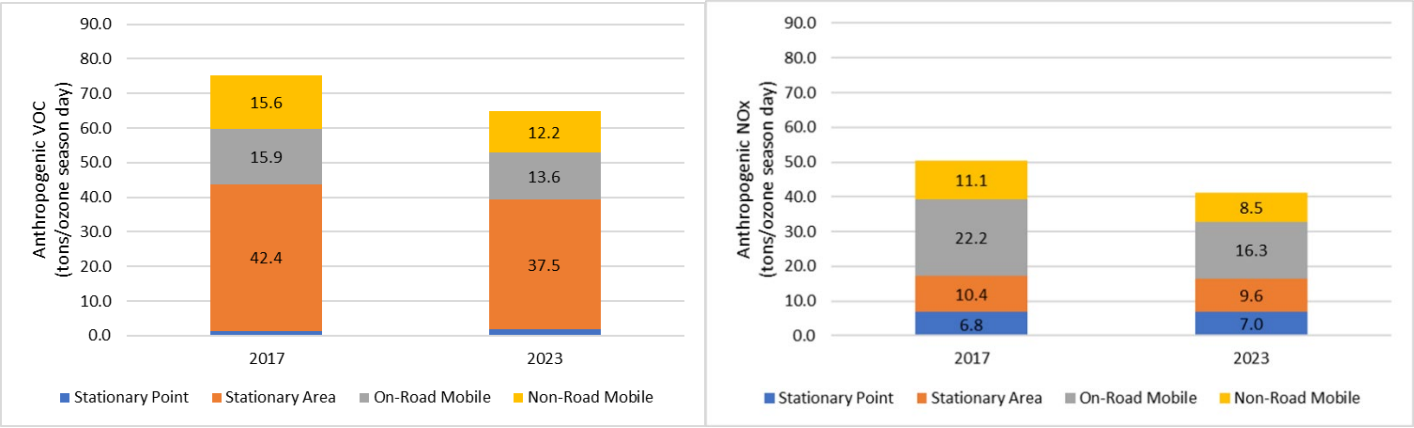


Figure 2-9 provides a comparison of base year and future year emissions for the Greater Connecticut area. Both VOC and NOx emissions are projected to decrease in Greater Connecticut over the six-year period from 2017 and 2023. Anthropogenic VOC emissions are projected to decrease by approximately 14 percent, after accounting for growth, while anthropogenic NOx emissions are projected to decrease by 18 percent. The largest reductions are expected in the on-road (14 percent for VOC and 27 percent for NOx) and non-road (22 percent for VOC and 23 percent for NOx) sectors. Stationary point sources are the only source category with projected VOC and NOx emissions that increase in 2023 (7 percent increase for VOC and 3 percent increase for NOx).

Figure 2-9. *Comparison of 2017 and 2023 VOC and NOx Emissions for Greater Connecticut.*



3 Reasonable Further Progress

Sections 172(c)(2) and 182(b)(1) of the CAA require nonattainment areas to include a demonstration of reasonable further progress (RFP). The Implementation Rule for the 2015 ozone standards describes the RFP requirements applicable to Connecticut's nonattainment areas. Specifically, as moderate nonattainment areas, the Greater Connecticut and Southwest Connecticut nonattainment areas are required to secure at least a 15 percent reduction in ozone precursor emissions within six years after the 2017 baseline year. The RFP mandate will be satisfied for the multi-state nonattainment area if each state demonstrates at least a 15 percent reduction in its portion of the area between 2017 and 2023.

To demonstrate RFP, projected emissions of NOx and VOC will be less than or equal to calculated target levels set for the end of the RFP period. This section describes the methodology and calculations used to establish the 2023 target emission levels for the Greater Connecticut and Southwest Connecticut nonattainment areas. It also demonstrates that the areas will meet RFP requirements because projected NOx and VOC emissions will be less than the calculated target levels.

3.1 Base Year Inventory

The base year inventory for RFP is comprised of all anthropogenic sources of VOC and NOx for a typical high ozone day in 2017. This is identical to the 2017 base year summer day inventory presented in Section 2, which excludes biogenic emissions sources. The tables below present the ozone season day emissions for the anthropogenic portion of the Greater Connecticut and Southwest Connecticut inventories. This is the starting point for calculation of required target level emissions to show reasonable further progress.

Table 3-1. *Base Year RFP Inventory for Southwest Connecticut.*

Ozone Precursor Pollutant	2017 Base RFP Inventory (TPD)				
	Stationary Point	Stationary Area	On-road Mobile	Non-road Mobile	Total
NOx	7.7	10.4	24.6	15.0	57.7
VOC	1.6	42.7	17.6	18.5	80.4

Table 3-2. *Base Year RFP Inventory for Greater Connecticut.*

Ozone Precursor Pollutant	2017 Base RFP Inventory (TPD)				
	Stationary Point	Stationary Area	On-road Mobile	Non-road Mobile	Total
NOx	6.8	10.4	22.2	11.1	50.5
VOC	1.4	42.4	15.9	15.6	75.3

3.2 Calculation of Target Levels

EPA's RFP methodology specifies that the required 15 percent RFP emission reductions can come from any combination of VOC and NOx reductions occurring between the base year (2017) and six years later (2023) for moderate areas. Consistent with past practice, DEEP has elected to establish 2023 target levels comprised of 10 percent NOx reductions and 5 percent VOC reductions. While both pollutants contribute to ozone formation, the preference for NOx reductions recognizes that Connecticut's ozone problem is generally NOx limited. The tables below show the calculation of the Target Levels for each of Connecticut's nonattainment areas' 2023 ozone season day inventory.

Table 3-3. *Determination of 2023 Target Level Emissions to Demonstrate RFP for Southwest Connecticut.*

Southwest Connecticut Target Level Emission Calculations	NOx (tons/ozone season day)	VOC (tons/ozone season day)
1. Base Year (2017)	57.7	80.4
2. RFP Reductions needed (Base*0.1) for NOx and (Base *0.05) for VOC	5.8	4.0
3. 2023 Target Level (Base-RFP Reductions Needed)	51.9	76.4

Table 3-4. *Determination of 2023 Target Level Emissions to Demonstrate RFP for Greater Connecticut.*

Greater Connecticut Target Level Emission Calculations	NOx (tons/ozone season day)	VOC (tons/ozone season day)
1. Base Year (2017)	50.5	75.3
2. RFP Reductions needed (Base*0.1) for NOx and (Base *0.05) for VOC	5.1	3.8
3. 2023 Target Level (Base-RFP Reductions Needed)	45.4	71.5

3.3 Compliance with RFP Requirements

Compliance with the RFP requirements is met provided that projected 2023 ozone season day emissions in Southwest and Greater Connecticut are less than or equal to the calculated RFP Target Levels.

Projected 2023 emissions were developed as described in Section 2.

Table 3-5 and Table 3-6 compare projected 2023 ozone season day VOC and NOx emissions for Southwest Connecticut and Greater Connecticut to the required RFP target levels. Both NOx and VOC emission levels in 2023 are projected to be well below the target levels, thus meeting the RFP requirement.

Table 3-5. *Comparison of 2023 Projected Emissions to the Required RFP Target Levels for VOC.*

Nonattainment Area	2017	2023				
	Baseline VOC Emissions (tons/ozone season day)	**RFP Required % Reduction**	**Required Emission Reductions** (tons/ozone season day)	**RFP Target Emission Level** (tons/ozone season day)	**Projected 2023 Emissions** (tons/ozone season day)	**2023 VOC Excess** (tons/ozone season day)
Southwest CT	80.4	5%	4.0	76.4	69.6	+6.8
Greater CT	75.3	5%	3.8	71.5	65.0	+6.5

Table 3-6. *Comparison of 2023 Projected Emissions to the Required RFP Target Levels for NOx.*

Nonattainment Area	2017	2023				
	Baseline NOx Emissions (tons/ozone season day)	**RFP Required % Reduction**	**Required Emission Reductions** (tons/ozone season day)	**RFP Target Emission Level** (tons/ozone season day)	**Projected 2023 Emissions** (tons/ozone season day)	**2023 NOx Excess** (tons/ozone season day)
Southwest CT	57.7	10%	5.8	51.9	46.9	+5.0
Greater CT	50.5	10%	5.1	45.4	41.3	+4.1

4 Reasonable Further Progress Milestone Demonstration

Section 172(c)(9) of the CAA requires that nonattainment area plans provide for the implementation of contingency measures to be undertaken if the area fails to make reasonable further progress goals. Connecticut's nonattainment areas were reclassified to serious nonattainment in July of 2024 and section 182(g)(1) of the CAA requires that for each ozone nonattainment area classified serious or higher, the state shall determine at specified intervals whether each area has achieved the reduction in emissions required under the RFP provisions specified in CAA section 182 for that area's classification. The reduction in emissions required by the end of each interval is referred to as an applicable milestone. The initial RFP milestone occurs six years after the baseline year (i.e. 2023). Submittal of a satisfactory milestone compliance demonstration relieves Connecticut of the need for contingency measures for failure to achieve RFP goals.

Consistent with the requirement CAA section 182(b)(1) that moderate areas meet RFP goals within 6 years of the baseline date (i.e. 2023), this milestone demonstration shows that actual emissions in Connecticut's nonattainment areas met RFP goals by 2022, at least one year ahead of schedule, thus satisfying milestone requirement of CAA section 182(g)(1) that the emissions reduction satisfying RFP were achieved during the preceding classification intervals.

While meeting the milestone ahead of schedule is not required, data for 2023 is not currently available. As such, DEEP relied on emissions data developed for the 2022 emissions modeling platform, a product of the National Emissions Inventory Collaborative, for this milestone demonstration. The 2022 Emissions Modeling Platform is based on the 2020 National Emissions Inventory released in the spring of 2023 with updates to better represent the year 2022. The modeling platform contains emissions inventories for 2022, spatial surrogates, temporal profiles, and other ancillary files. DEEP participated in the development of the 2022 emissions platform along with EPA and other state, local and federal agencies.

The tables below show actual ozone season day NOx and VOC emissions for each of the major sectors of the inventory for Connecticut's nonattainment areas. Data were taken from EPA's 2022 emissions inventory collaborative emissions modeling platform.[54] Ozone season day emissions for each source category were calculated consistent with the procedures for calculating base year ozone season day emissions presented in Section 2 of this document and used for the RFP demonstration.

[54] https://www.epa.gov/air-emissions-modeling/2022v1-emissions-modeling-platform

Table 4-1. *Summary of Actual Southwest Connecticut Anthropogenic NOx and VOC Emissions for 2022 Ozone Season Day.*

Source Category	Ozone Season Day NOx (tons/ozone season day)	Ozone Season Day VOC (tons/ozone season day)
Stationary Point	7.8	1.5
Stationary Area	10.1	41.7
On-Road Mobile	14.9	12.6
Non-Road Mobile	13.0	18.9
Total Anthropogenic	**45.8**	**74.7**

Source: 2022 emissions are based on EPA's 2022 inventory.

Table 4-2. *Summary of Actual Greater Connecticut Anthropogenic NOx and VOC Emissions for 2022 Ozone Season Day.*

Source Category	Ozone Season Day NOx (tons/ozone season day)	Ozone Season Day VOC (tons/ozone season day)
Stationary Point	5.4	1.3
Stationary Area	7.8	41.8
On-Road Mobile	13.3	11.3
Non-Road Mobile	9.7	15.7
Total Anthropogenic	**36.2**	**70.1**

Source: 2022 emissions are based on EPA's 2022 inventory.

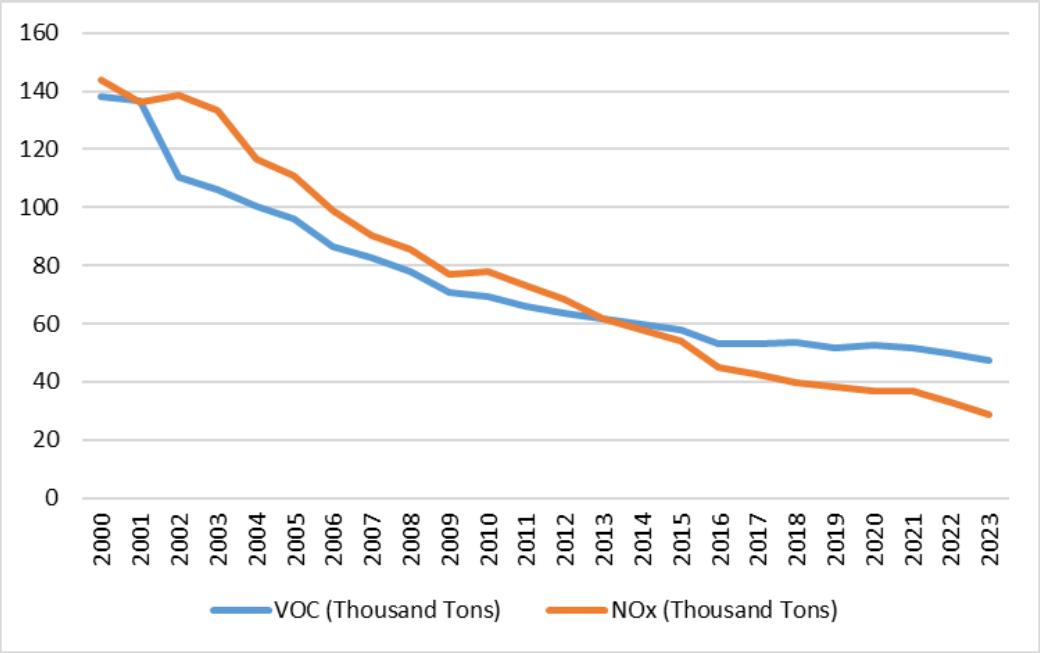
The following table compares 2022 emissions with RFP target levels. The table shows that, by 2022, Connecticut's nonattainment area emissions had already met RFP target levels with excess emissions reductions.

Table 4-3. *Milestone Summary for Connecticut's Nonattainment Areas.*

	Southwest CT			Greater CT		
Pollutant	**RFP Target** (tons/ozone season day)	**2022 Actual Emissions** (tons/ozone season day)	**Milestone Target Met and Excess** (tons/ozone season day)	**RFP Target** (tons/ozone season day)	**2022 Actual Emissions** (tons/ozone season day)	**Milestone Target Met and Excess** (tons/ozone season day)
NOx	51.9	45.8	6.1	45.4	36.2	9.2
VOC	76.4	74.7	1.7	71.5	70.1	1.4

Annual emission trends, including estimates for 2023, for the state are shown in the figure below. The 2023 estimates include updates to emissions from electric generating units, and onroad and nonroad sources, with 2022 emissions carried forward for remaining data. The trend in annual emissions out to 2023 does not indicate that any abnormally high activity occurred in 2023 that could have led to a reverse of the decline in ozone season day emissions that occurred from 2017 to 2022 as demonstrated within this section. We therefore conclude that ozone season day emissions in 2023 were at or below the levels for 2022.

Figure 4-1. *Statewide Annual Emissions Trends for Connecticut.*



Source of data: https://www.epa.gov/air-emissions-inventories/air-pollutant-emissions-trends-data

Since DEEP has demonstrated that emissions in both nonattainment areas have been reduced beyond the minimum required RFP levels prior to 2023, contingency measures related to failure to meet RFP goals should not be applicable.

5 Connecticut's Motor Vehicle Inspection and Maintenance (I/M) Program

CAA section 182(b)(4) requires moderate nonattainment areas to provide for a basic motor vehicle inspection and maintenance program. Additionally, because Connecticut is in the OTR, portions of Connecticut's nonattainment areas that are in metropolitan statistical areas with a population of 100,000, or more, are required to implement an enhanced I/M program pursuant to CAA 184(b)(1).[55] Federal I/M program requirements are specified in 40 CFR 51 Subpart S. All elements of the basic program described in 40 CFR 51.352 are included in the enhanced program as described in 40 CFR 51.351.

Connecticut has required in-use vehicles to undergo periodic emission inspection and maintenance since 1983. The program has been modified over the years to meet CAA-required enhancements and to accommodate technological advancements in new vehicles such as on-board diagnostics (OBD).

Due to prior more stringent nonattainment designations, Connecticut implements an enhanced I/M program statewide, thus exceeding the I/M requirements for this SIP. Moreover, whereas EPA's I/M requirements only cover gasoline powered vehicles up to 8,500 pounds (lbs.) gross vehicle weight rating (GVWR), Connecticut's I/M program increases the number of vehicles subject to the enhanced standard by testing both gasoline and diesel motor vehicles through 10,000 lbs. GVWR.

Table 5-1. Basic and Enhanced I/M Requirements.

Basic I/M Program	Enhanced I/M Program
• Requires onboard diagnostic (OBD) testing on Model Year (MY) 2001 and newer vehicles. • Requires idle testing of vehicles MY 2000 and older vehicles.	• Requires OBD testing on MY 1996 and newer vehicles. • Requires more comprehensive tailpipe testing of MY 1995 and older vehicles.
• Emission Control Device Inspection: None	• Emission Control Device Inspection: Visual inspection for the presence of catalytic converter and other major emission control equipment.

* All elements of the basic program are included in the enhanced program.

Connecticut's motor vehicle inspection and maintenance (I/M) program currently meets the requirements of an enhanced I/M program based on prior state-wide designations of serious and severe for the 1-hour ozone standards. The I/M SIP, consisting of a program narrative and implementing authority contained in RCSA 22a-174-27 and Connecticut General Statutes (CGS) 14-164c, was approved into Connecticut's SIP on December 5, 2008 [73 FR 74019]. Connecticut recertified this program as satisfying the moderate requirements when it made the submittals in 2017. The program was approved as satisfying moderate nonattainment requirements on March 29, 2019 [84 FR 11884] and the associated notice of proposed rulemaking [February 1, 2019; 84 FR 1015] recognized the program as enhanced.

[55] Litchfield County is not part of a metropolitan statistical area and does not fall under this requirement.

In 2021, Connecticut entered into a contract with Opus Inspection Incorporated to provide administration of the Connecticut program for the next six years. Included in the contract are program enhancements including customer service improvements such as vehicle identification number verification and most notably conditions for expansion to emissions testing for certain medium and heavy-duty vehicles up to 14,000 lbs. GVWR.[56]

DEEP and the Connecticut Department of Motor Vehicles (DMV) coordinate to evaluate and provide periodic evaluations of its enhanced motor vehicle I/M Program. Reports are written and submitted to EPA in fulfillment of the requirement to provide annual I/M reports pursuant to 40 CFR 51.366 and can be found on DEEP's webpage.[57]

This approved enhanced I/M program will continue to be implemented statewide and remains an important control strategy. For the purposes of this SIP, DEEP re-certifies its I/M program as enhanced and if deemed necessary,[58] commits to submitting an I/M SIP performance standard modeling (PSM) assessment to EPA using their October 2022 PSM guidance.

[56] Connecticut Department of Administrative Services Contract Portal, found at: https://biznet.ct.gov/SCP_Documents/Results/22360/Final%20DMV%20Opus%20Contract%20with%20Exhibit%20A%2022%20January%202021.pdf. Page 8, section 4.9.
[57] https://portal.ct.gov/DEEP/Air/Mobile-Sources/Vehicle-Emission-Testing
[58] On April 1, 2025, EPA concurred with the state's determination its I/M program meets the performance standard and requirements for Enhanced I/M.

6 Transportation Conformity Process and Motor Vehicle Emission Budgets

Transportation conformity serves as a bridge to connect air quality and transportation planning activities. Transportation conformity is required under section 176(c) of the CAA to ensure that highway and transit project activities receiving federal funds are consistent with ("conform to") the purpose and goals of the SIP. Conformity to a SIP is achieved if transportation programs or transit project activities do not cause or contribute to any new air quality violations, do not increase the frequency or severity of violations, and do not delay timely attainment of the relevant NAAQS or any required interim milestone.

Transportation conformity applies to areas that are designated nonattainment or "maintenance" (former nonattainment areas) for the following transportation-related criteria pollutants: ozone (O_3), particulate matter ($PM_{2.5}$ and PM_{10}), carbon monoxide (CO), and nitrogen dioxide (NO_2). Transportation conformity also requires addressing ozone precursor pollutants, which includes NOx and VOCs.

Transportation conformity addresses air pollution from on-road mobile sources such as cars, trucks, motorcycles, and buses. For this reason, transportation conformity budgets are often referred to as motor vehicle emission budgets (MVEB). There are also significant emissions from non-road mobile sources, area sources, and stationary sources that are not addressed by transportation conformity.

The CTDOT and the metropolitan planning organizations (MPOs) in Connecticut must demonstrate conformity for any transportation plans, transportation improvement programs (TIPs), or any federally supported highway and transit projects.

Conformity determinations are developed by CTDOT in consultation with DEEP and EPA. The Federal Transit Administration (FTA) and the Federal Highway Administration (FHWA), agencies of the United States Department of Transportation (USDOT), review the submittals from CTDOT and the Connecticut MPOs and make a conformity determination.

Conformity determinations consist of the following components:

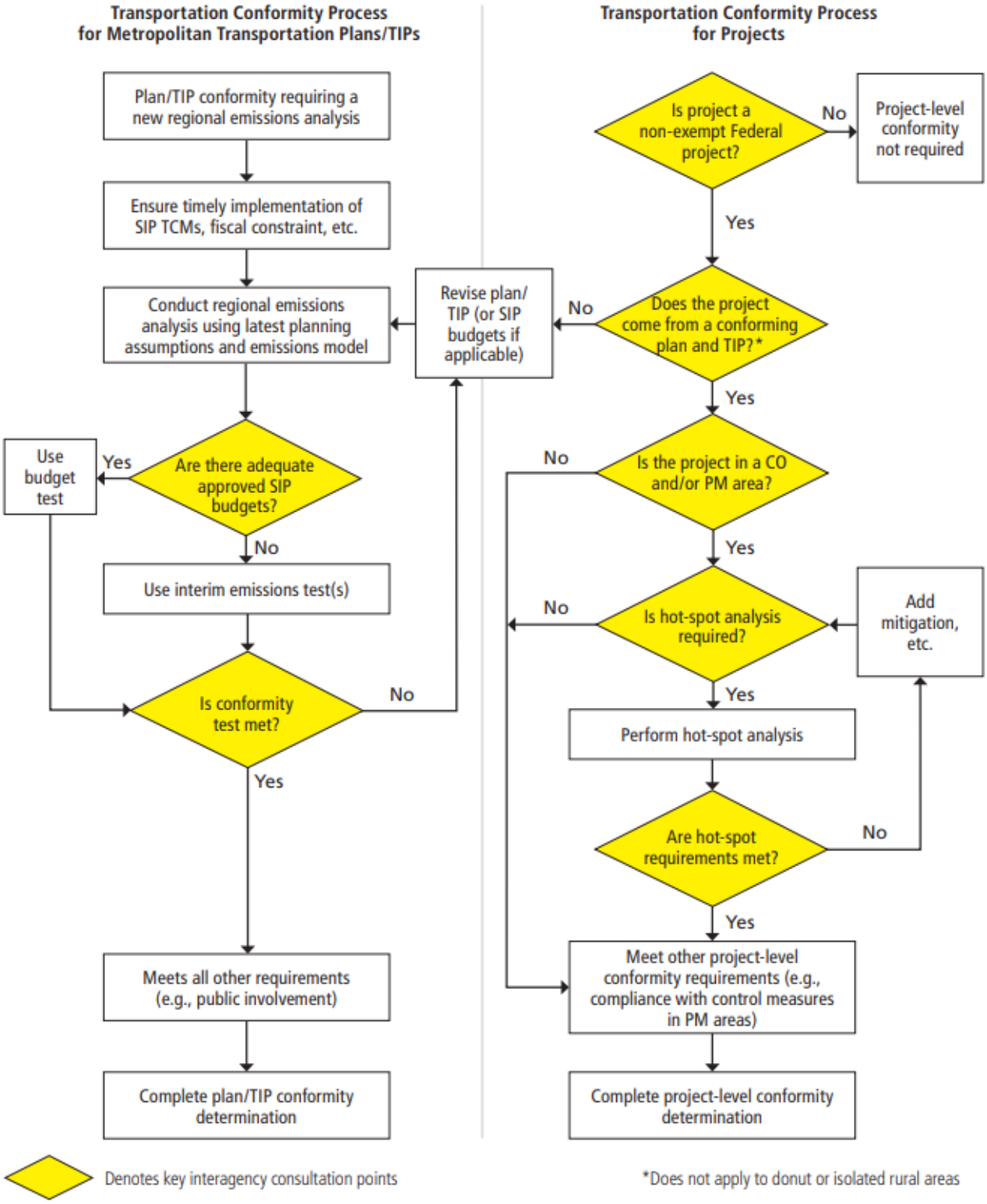
- Regional emissions analysis;
- Transportation modeling requirements;
- Latest planning assumptions and emissions model;
- Timely implementation of transportation control measures (TCMs);
- Interagency consultation;
- Public participation (consistent with USDOT regulations); and
- Fiscal constraint (consistent with USDOT regulations).

The regional emissions analysis is the primary component, which incorporates either a "budget"

test for areas or states with approved SIP budgets, or an interim emissions test for areas with no adequate or approved SIP budgets. Budgets are developed using various transportation and emissions models. Local modeling inputs are cooperatively developed by CTDOT and DEEP, using EPA recommended methods where applicable. Generally, CTDOT's estimated air emissions from transportation plans and TIPs must not exceed an emissions limit, or budget, established by DEEP as part of an attainment or maintenance SIP.

A general flowchart depicting the transportation conformity process is set forth in Figure 6-1 below. A more detailed explanation of transportation conformity and how the elements of a conformity determination interact can be found in EPA's *Transportation Conformity Guidance for 2015 Ozone NAAQS Nonattainment Areas [EPA-420-B-18-023, June 2018]*.

Figure 6-1. *General Flowchart of the Transportation Conformity Process.*



Source: Transportation Conformity: A Basic Guide for State and Local Officials, Federal Highway Administration

6.1 Transportation Conformity Regulatory History

The federal CAA and federal transportation reauthorization legislation passed in the 1990s established an interrelationship of clean air and transportation planning. To receive federal transportation funds, CTDOT and the MPOs in Connecticut must cooperatively work to develop and endorse an Air Quality Conformity Statement, which certifies to the federal government that the Statewide Transportation Improvement Program (STIP), which incorporates all TIPs, conforms to the requirements of the CAA amendments.

On August 15, 1997, the EPA published a major revision to the Transportation Conformity Rule.[59] The full text of the rule, which has been updated multiple times since 1997 as various transportation funding bills have been passed, is contained in 40 CFR Part 93 – Determining Conformity of Federal Actions to State or Federal Implementation Plans.[60]

The Safe, Accountable, Flexible, Efficient Transportation Equity Act: A Legacy for Users (SAFETEA-LU) revised the CAA conformity SIP requirements in 2005 to use state and local resources more efficiently.[61] SAFETEA-LU guided surface transportation policy and funding up until it was due to expire in 2009. Congress extended the provisions nine times until it finally expired on June 30, 2012.

On July 6, 2012, Moving Ahead for Progress in the 21st Century (MAP-21) was signed into law.[62] MAP-21 reauthorized the transportation programs that were previously authorized by SAFETEA-LU. The programs under MAP-21 continued through September 30, 2014, and finally expired, after five short-term extensions, on December 4, 2015.

On December 4, 2015, the Fixing America's Surface Transportation (FAST) Act was signed into law as the first long-term transportation funding bill since SAFETEA-LU.[63] The FAST Act authorizes federal highway, transit, safety and rail programs and funding certainty for five years - through September 30, 2020.

On September 30, 2020, the FAST Act was extended for one year until September 20, 2021, as a part of the Continuing Appropriations Act, 2021, and other Extensions Act.[64] The extension continued coverage for federal-aid highways and federal public transportation programs.

On November 15, 2021, the Infrastructure, Investment and Jobs Act (IIJA) was signed into law, providing transportation and infrastructure funding for five years.[65] This law intends to modernize roads, public transit, airports, and other infrastructure in efforts to reduce congestion and harmful emissions.

[59] 62 FR 43780
[60] 40 CFR Part 93
[61] Public Law 109-59
[62] Public Law 112-141
[63] Public Law 114-94
[64] Public Law 116-159
[65] Public Law 117-58

CTDOT regularly updates the STIP in accordance with the terms and provisions of the CAA relevant funding and authorization acts, and all regulations issued pursuant thereto. As part of STIP development, CTDOT conducts air quality assessments and prepares conformity reports. DEEP and EPA review the STIP and conformity reports.

6.2 Previous Motor Vehicle Emission Budgets (MVEBs) for the 2008 Ozone Standards

The transportation conformity rules at 40 CFR 93.10(c)(2) states that a nonattainment area with approved or adequate MVEBs in an applicable implementation plan or implementation plan submission for another NAAQS for the same pollutant, must use those existing MVEBs in transportation conformity determinations until MVEBs for the current NAAQS are submitted by the state and found adequate or are approved by the EPA.

The most recent previous MVEBs, the 2020 MVEBs as shown in Table 6-1 below, were submitted to EPA in 2022 with a SIP revision for the 2008 ozone standards.[66] These budgets were approved on April 1, 2025.[67]

Table 6-1. *2020 Motor Vehicle Emission Budgets.*

2020 Motor Vehicle Emission Budgets	VOC (tons/day)	NOx (tons/day)
Greater Connecticut	N/A*	N/A*
Southwest Connecticut	17.6	23.3

* Greater Connecticut currently attains the 2008 ozone standard, and as such, 2020 MVEBs are no longer required.

The MVEBs for 2017 were submitted to EPA for Connecticut's nonattainment areas while designated moderate nonattainment for the 2008 ozone NAAQS. The 2017 MVEBs were federally approved into the SIP effective October 31, 2018 [83 FR 49297] and appear in Table 6-2.[68]

Table 6-2. *2017 Baseline Motor Vehicle Emission Budgets.*

2017 Motor Vehicle Emission Budgets	VOC (tons/day)	NOx (tons/day)
Greater Connecticut	15.9	22.2
Southwest Connecticut	17.6	24.6

As the most recently approved MVEBs, the 2017 MVEBs are currently used for conformity tests under both the 2008 and 2015 ozone standards. Additionally, for nonattainment areas for the 2015 ozone NAAQS, 2017 is the baseline year for transportation conformity purposes.[69]

[66] "Revision to Connecticut's State Implementation Plan: Ozone Attainment Demonstration for Areas Classified Serious Nonattainment for the 2008 Ozone Standards"; DEEP; June 2022.
[67] 90 FR 14342
[68] https://www.ecfr.gov/current/title-40/chapter-I/subchapter-C/part-52/subpart-H/section-52.377 40 CFR 52.377(t).
[69] 2015 Ozone NAAQS Implementation Rule: https://www.govinfo.gov/content/pkg/FR-2018-12-06/pdf/2018-25424.pdf page 63005.

6.3 Final Motor Vehicle Emissions Budgets for the 2015 Ozone Standard

As was described in Section 2, this plan discusses numerous emission control programs designed to reduce ozone precursor emissions in Connecticut. Emission control strategies are targeted at all types of emission sources, including on-road sources such as cars and diesel trucks. Projected 2023 emission levels are consistent with achieving RFP requirements in the Greater Connecticut and Southwest Connecticut areas; therefore, the associated 2023 on-road emission projections qualify for use as MVEBs for RFP purposes.

The on-road portion of the 2023 emission estimates will, after being deemed adequate or approved by EPA, become the sole governing MVEBs for Greater Connecticut and Southwest Connecticut for all Ozone-related Transportation Conformity analyses. Table 6-3 displays the 2023 emission budgets for both Greater Connecticut and Southwest Connecticut. Note that, as with previous attainment and maintenance SIPs approved by EPA for Connecticut, the on-road vehicle emission estimates for 2023 include a two percent buffer to account for uncertainties in future transportation planning, such as changes to modeling procedures that could affect future year emission estimates that must be compared to budgets established with previous model versions. The resulting final budgets are much more stringent than the current budgets for Connecticut's nonattainment areas and will help fulfill the requirements to attain the ozone NAAQS and satisfy the 15 percent RFP requirement for the 2015 ozone NAAQS.

Table 6-3. *2023 Motor Vehicle Emission Budgets.*

2023 Motor Vehicle Emission Budgets	VOC (tons/day)	NOx (tons/day)
Greater Connecticut	13.6	15.5
Southwest Connecticut	15.2	17.6