Attainment Plan
for the
Milwaukee, Wisconsin
2015 Ozone National Ambient Air Quality Standard
Moderate Nonattainment Area

Milwaukee County, Ozaukee County, Racine County (Partial), Washington County (Partial), Waukesha County (Partial)

DRAFT FOR PUBLIC REVIEW

Developed By:
The Wisconsin Department of Natural Resources

December 2024

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List of Acronyms

AEI	WDNR's air emissions inventory
CAA	Clean Air Act
CAIR	Clean Air Interstate Rule
CART	Classification and regression tree
CBL	Convective boundary layer
CSAPR	Cross-State Air Pollution Rule
CTG	Control techniques guideline
EGU	Electric generating unit
EPA	U.S. Environmental Protection Agency
FID	Facility identification number
I/M	Vehicle inspection and maintenance (emissions testing)
ICI	Industrial, commercial and institutional emissions sources
LADCO	Lake Michigan Air Directors Consortium
MOVES	EPA's MOtor Vehicle Emission Simulator model
MPO	Metropolitan planning organization
MVEB	Motor vehicle emissions budget
NAAQS	National Ambient Air Quality Standard
NAICS	North American Industrial Classification System
NEI	National Emissions Inventory
NESHAP	National Emission Standards for Hazardous Air Pollutants
NOx	Nitrogen oxides (NO and NO_2)
NNSR	Nonattainment New Source Review (permitting program)
ppb	Parts per billion
ppm	Parts per million
RACM	Reasonably available control measures
RACT	Reasonably available control technology
RFP	Reasonable further progress
RTP	Regional transportation plan
SIP	State implementation plan
TIP	Transportation improvement program
tposd	Tons per ozone season day
tposwd	Tons per ozone season weekday
VMT	Vehicle miles traveled
VOC	Volatile organic compounds
WDNR	Wisconsin Department of Natural Resources
WDOT	Wisconsin Department of Transportation

1. INTRODUCTION

The Wisconsin Department of Natural Resources (WDNR) has prepared this attainment plan to fulfill the Clean Air Act (CAA) state implementation plan (SIP) requirements for the Milwaukee, Wisconsin moderate nonattainment area for the 2015 ozone National Ambient Air Quality Standard (NAAQS). This document was developed in accordance with the U.S. Environmental Protection Agency (EPA)'s implementation rule for the 2015 ozone NAAQS (83 FR 62998) and other applicable guidance and requirements. It addresses all required moderate-area attainment requirements for the 2015 ozone NAAQS as they apply to this nonattainment area.

1.1. Clean Air Act Requirements

The CAA requires an area not meeting a NAAQS for a specified criteria pollutant to develop or revise its SIP to expeditiously attain and maintain the NAAQS in that nonattainment area. For moderate nonattainment areas, these SIP requirements are:

1) An attainment plan (required under CAA section 182(b)).
2) Reasonably Available Control Technology (RACT) for volatile organic compounds (VOCs) and nitrogen oxides (NOx)(CAA section 182(b)(2)).
3) Reasonably Available Control Measures (RACM)(CAA section 172(c)(1)).
4) Reasonable Further Progress (RFP) reductions in VOC and/or NOx emissions in the area (CAA sections 172(c)(2) and 182(b)(1)).
5) Contingency measures to be implemented in the event of failure to attain the standard (CAA section 172(c)(9)).
6) A vehicle inspection and maintenance (I/M) program, as applicable (CAA section 181(b)(4)).
7) NOx and VOC emission offsets at a ratio of 1.15 to 1 for major source permits (CAA section 182(b)(5)).

This plan addresses the first six of these requirements for the Milwaukee 2015 ozone NAAQS moderate nonattainment area. Wisconsin has an approved Nonattainment New Source Review (NNSR) permitting program that fulfills the seventh requirement.[1] Where existing rules implementing these requirements exist, by this submittal the WDNR certifies them as meeting the requirements for Moderate nonattainment areas for this NAAQS.

1.2. The Milwaukee 2015 Ozone NAAQS Nonattainment Area

Nonattainment History

Historically, exceedances of the federal ozone standards have been recorded in southeast Wisconsin and along the lakeshore of Lake Michigan, including all or parts of the Milwaukee area. Counties in the greater Milwaukee area have been designated nonattainment for several previous ozone NAAQS, but have subsequently been either redesignated to attainment for, or found to be attaining, each of these standards (Table 1.1).

[1] The EPA approved Wisconsin's NNSR SIP submittal for the 2015 ozone NAAQS on Jan. 19, 2022 (87 FR 2719).

Table 1.1. Milwaukee area ozone NAAQS nonattainment history.

NAAQS	1979	1997	2008	2015
Level	0.12 ppm	0.08 ppm	0.075 ppm	0.070 ppm
Averaging Period	1 hour	8 hour	8 hour	8 hour
Nonattainment Area	6-county Milwaukee-Racine area[a]	6-county Milwaukee-Racine area[a]	None	5-county Milwaukee area (partial)[c]
Most Recent Classification	Severe-17	Moderate	Attainment	Moderate
Redesignated to Attainment	NAAQS revoked[b]	7/31/2012 (77 FR 45252)	N/A	TBD

[a] Kenosha, Racine, Milwaukee, Ozaukee, Washington, and Waukesha counties.

[b] The EPA finalized a determination of attainment for the Milwaukee-Racine nonattainment area on Apr. 24, 2009 (74 FR 18641). This occurred after the 1979 ozone NAAQS was revoked, so the area was never formally redesignated to attainment of that standard.

[c] Milwaukee and Ozaukee counties and parts of Racine, Washington, and Waukesha counties.

2015 Ozone NAAQS

In October 2015, the EPA finalized a revision to the 8-hour ozone NAAQS (80 FR 65291). The 2015 ozone NAAQS (0.070 parts per million; ppm) is more stringent than the previous 2008 ozone NAAQS (0.075 ppm). On June 4, 2018, the EPA published a final rulemaking that designated parts of Milwaukee and Ozaukee counties as marginal nonattainment for the 2015 ozone NAAQS (83 FR 25776).[2]

On June 14, 2021, in response to a July 10, 2020, decision by the D.C. Circuit Court, the EPA published a final rule revising the 2015 ozone NAAQS designations for 13 counties, including those counties located in the greater Milwaukee area (86 FR 31438). As part of this action, the EPA revised and expanded the nonattainment area in Milwaukee to include all of Milwaukee and Ozaukee counties and part of Racine, Washington, and Waukesha counties.[3] This revised designation was effective July 14, 2021. This area retained the marginal area classification and attainment date of August 3, 2021 of the original nonattainment area.

Since the Milwaukee nonattainment area did not attain the 2015 ozone NAAQS by its marginal area due date, on October 7, 2022 the EPA reclassified the area from marginal to moderate nonattainment and set a new attainment date of August 3, 2024 (87 FR 60897). The WDNR has developed this submittal to fulfill moderate attainment planning requirements for this area as required by sections 172(c) and 182(c)(2) of the CAA.

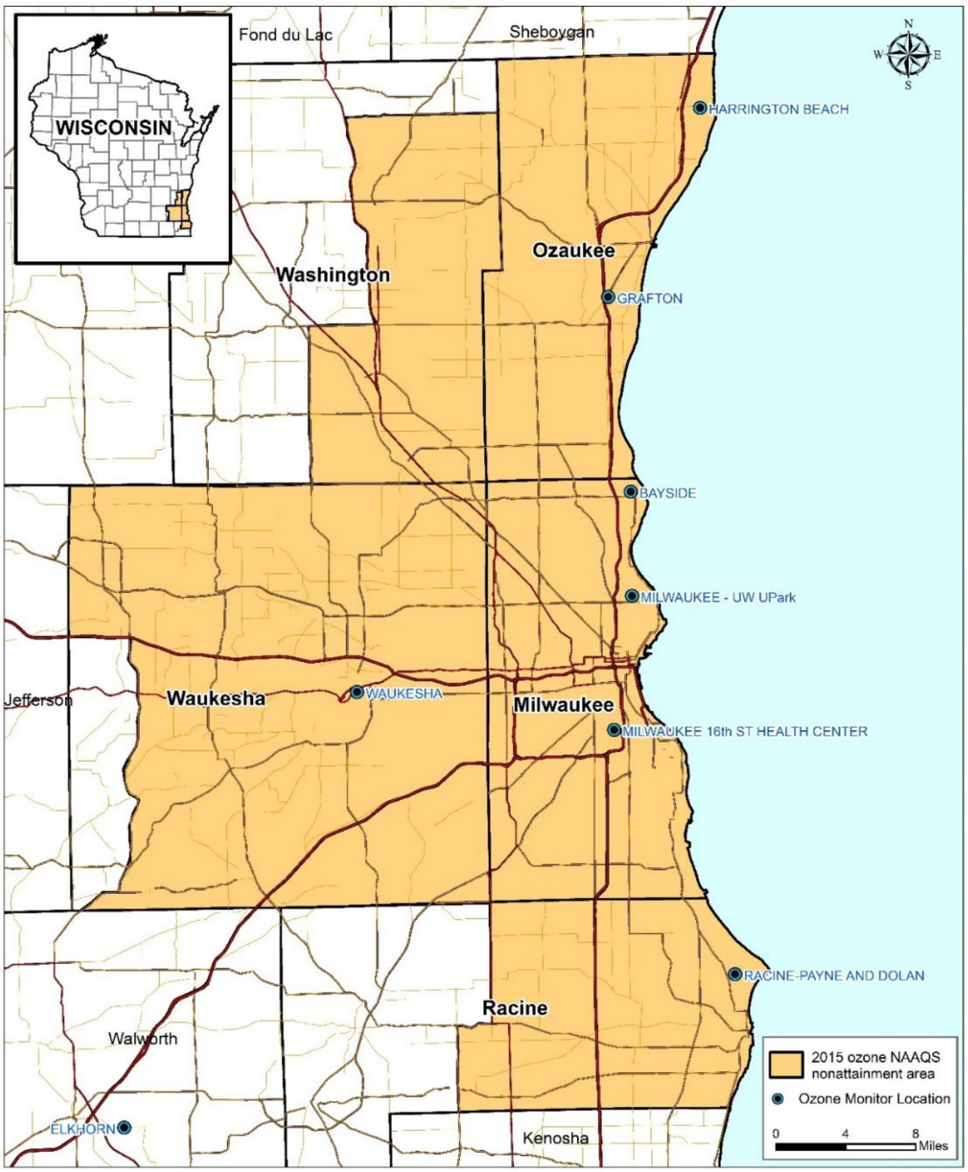
[2] This area was designated the “Northern Milwaukee/Ozaukee Shoreline, Wisconsin” nonattainment area.

[3] This area was designated the “Milwaukee, Wisconsin” nonattainment area. This designation replaced the previous “Northern Milwaukee/Ozaukee Shoreline” area.

Description of the Nonattainment Area

The Milwaukee 2015 ozone NAAQS nonattainment area, as revised by the EPA in July 2021, consists of all of Milwaukee and Ozaukee counties and part of Racine, Washington, and Waukesha counties (Figure 1.1). The nonattainment area constitutes a large portion of the Milwaukee–Waukesha–West Allis (Milwaukee, Waukesha, Washington, and Ozaukee counties) and Racine (Racine County) metropolitan statistical areas. The 2020 population in the Milwaukee 2015 ozone nonattainment area was 1,702,222.

Figure 1.1. Map of the Milwaukee, Wisconsin 2015 ozone NAAQS nonattainment area, with locations of ozone monitors shown.



1.3. Overview of this Attainment Plan

The remainder of this attainment plan SIP submittal is structured as follows:

Section 2 provides the conceptual model for ozone formation in the Lake Michigan region, including the nonattainment area. This section describes how synoptic-scale and mesoscale meteorology combine to create high ozone along the Wisconsin lakeshore under certain conditions, which complicates state efforts to address nonattainment.

Section 3 presents base and future year inventories for the nonattainment area and describes how these inventories show that the state has met its requirements for reasonable future progress. This section also describes how permanent and enforceable emissions reduction measures have reduced ozone precursor emissions.

Section 4 summarizes the attainment modeling that was completed in support of this plan, as required by the CAA.

Section 5 presents air quality information and weight of evidence support. This includes analysis of trends in ozone and ozone precursor emissions, as well as meteorologically adjusted trends in ozone concentrations. This section also demonstrates the important roles that transport, meteorology and chemistry play in determining ozone concentrations in the nonattainment area.

Section 6 describes how the state has addressed all other moderate nonattainment area SIP requirements. These requirements include transportation conformity, RACT programs for NOx and VOCs, RACM, a vehicle I/M program, and contingency measures.

Section 7 describes how the WDNR complied with the applicable public participation requirements.

Section 8 summarizes the conclusions of this submittal.

Collectively, this plan contains or otherwise addresses all moderate-area requirements required under the Clean Air Act for this nonattainment area.

2. OZONE DYNAMICS ALONG THE WISCONSIN LAKESHORE

2.1. Introduction

While ozone concentrations in the region have decreased dramatically due to implementation of an array of measures controlling emissions of ozone precursors, many states around Lake Michigan have areas that are in nonattainment of the 2015 ozone NAAQS. This discussion describes the complex dynamics that cause elevated ozone concentrations in the upper Midwest. These dynamics have been extensively studied for over three decades and are well documented.[4]

Wisconsin's lakeshore monitors most frequently measure ozone concentrations exceeding the ozone NAAQS from late May through early August. Ozone concentrations peak in the late spring and early summer because of the abundance of sunlight and heat, both of which drive ozone formation. In addition, strong land-lake temperature gradients in late spring and early summer drive lake breeze circulations, which contribute to high ozone concentrations, as discussed below.

The region's persistent ozone problems have been shown to be due to the unique meteorology of the Lake Michigan area. This meteorology causes transport of significant amounts of ozone and emissions of ozone precursors from upwind sources to lakeshore counties in Wisconsin and neighboring states. Two types of meteorological patterns have been shown to affect ozone concentrations in the region:

1) Synoptic scale meteorology[5] transports high concentrations of ozone and ozone precursors northward from source regions to the south and southeast.

2) Mesoscale meteorology[6] (via land-lake breeze circulation patterns) carries precursors over the lake, where they react to form ozone. Winds then shift to move the high ozone air onshore.

2.2. The Role of Synoptic-Scale Meteorology on High Ozone Days

Research has shown that high pressure systems can generate meteorological conditions favorable to elevated ozone as they move through the region from west to east during late May - early September. These systems are typified by hazy, sunny skies with generally weak, clockwise-rotating winds and relatively shallow mixing such that pollution concentrations are not diluted by mixing. These weather conditions contribute to the buildup of considerable amounts of ozone precursors and facilitate formation of ozone via photochemical reactions.

The location of surface high pressure systems is an important driver of ozone transport into the region. Research has shown that ozone episodes are generally associated with high pressure systems over the eastern U.S. that transport pollutants and precursors from the south and east

[4] This discussion uses some vintage data to illustrate the science being described; however, the findings discussed in this section all still apply, as they have been extensively studied and documented over several decades.
[5] Synoptic-scale meteorology refers to weather features of 24-48 hours' duration, whereas mesoscale meteorology refers to weather patterns of shorter duration.

into the region.[6,7] One study estimated that 50% of Wisconsin's ozone exceedance days during 1980-1988 under the 1-hour ozone NAAQS occurred when the center of a high pressure system was situated southeast of the area (i.e., Ohio and east thereof).[8] Under these circumstances, high ozone concentrations in the Lake Michigan region may result when polluted air from high emissions regions such as the Ohio River Valley is transported northward along the western side of a high pressure system.[9] In addition, while emissions from the heavily industrialized Chicago and Milwaukee areas have decreased dramatically in recent decades, sources in these large metropolitan areas still generate significant ozone precursor emissions. Pollution from sources in these areas can add to the pool of pollution transported into the region.[7]

Figure 2.1 shows the synoptic scale weather pattern for one such episode, along with the resulting patterns in ozone concentrations. On this day, a high pressure system was located to the southeast, centered over Virginia. Southeasterly to southerly winds on the western side of this system carried pollutants from the Ohio River Valley to Lake Michigan. This episode shows a common pattern for ozone distributions on episode days: ozone concentrations were lowest in the regions with the highest emissions (in central Chicago and extending into northwestern Indiana) and the highest in rural coastal areas far downwind. During such classic transport episodes, peak ozone concentrations move northward over the course of the day. For example, on the day shown in Figure 2.2, ozone peaked at Wisconsin's southern Chiwaukee Prairie monitor between 11 a.m. and 1 p.m., at the Kohler Andrae monitor midway up the coast between 2 p.m. and 4 p.m., and at the northern Newport monitor between 4 p.m. and 6 p.m.

2.3. The Role of Mesoscale Meteorology on High Ozone Days

The synoptic meteorological conditions often work in combination with unique lake-induced mesoscale meteorological features to produce the highest ozone concentrations in this region. Wisconsin's ozone nonattainment areas are located along Lake Michigan. With a surface area of approximately 22,400 square miles, Lake Michigan acts as a huge heat sink during the warm months. Figure 2.2 highlights the considerable difference between the over-land air temperatures (measured at Racine, Wisconsin) and over-water air temperatures (measured at a buoy in southern Lake Michigan) during a 5-day ozone episode in June 2002. The strong daytime temperature contrast between the warm land and cold lake can lead to the formation of a thermally driven circulation cell called the lake breeze, which runs approximately perpendicular to the Lake Michigan shoreline (Figure 2.3). As this figure shows, the lake breeze is generally preceded by an early morning land breeze, driven by relatively warm temperatures over the lake. The land breeze can carry ozone precursors emitted from urban areas, primarily Chicago, out over the lake, where they can react to form ozone. The onshore flow of the lake breeze

[6] Dye, T.S., P.T. Roberts, and M.E. Korc, 1995: Observations of transport processes for ozone and ozone precursors during the 1991 Lake Michigan Ozone Study. J. App. Meteor, 34: 1877-1889.
[7] Hanna, S.R., and J.C. Chang, 1995: Relations between meteorology and ozone in the Lake Michigan region. J. Applied Meteorology, 34: 670-678.
[8] Haney, J.L., S.G. Douglas, L.R. Chinkin, D.R. Souten, C.S. Burton, and P.T. Roberts, 1989: Ozone Air Quality Scoping Study for the Lower Lake Michigan Air Quality Region, SAI report #SYSAPP-89/101, prepared for the EPA, August, 197 pp.
[9] For example, Ragland, K. and P. Samson, 1977: Ozone and visibility reduction in the Midwest: evidence for large-scale transport. J. Applied Meteorology, 16: 1101–1106.

circulation then transports elevated ozone from over the lake onshore into southeastern Wisconsin.

Figure 2.1. Surface synoptic weather map for 6 a.m. CST (left) and MDA8 ozone concentrations (right) for the Lake Michigan region for June 19, 2016.

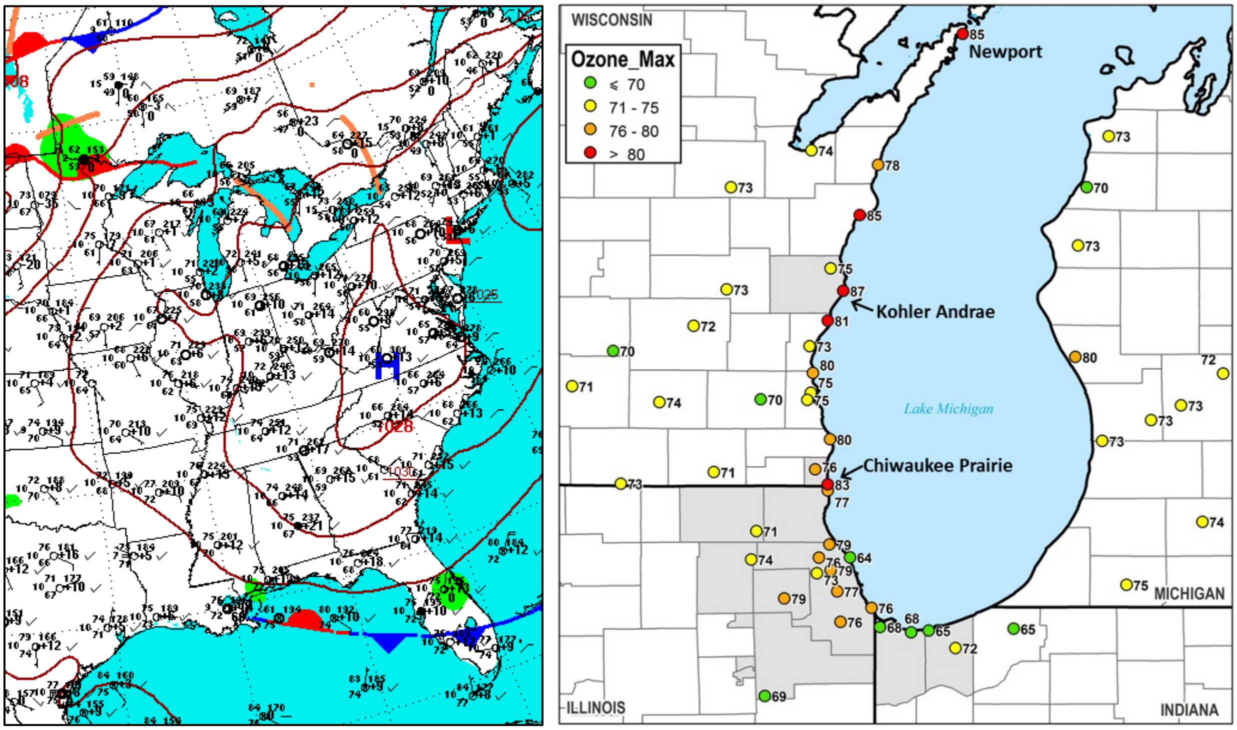


Figure 2.2. Hourly surface air temperatures at Racine, WI and the South Lake Michigan Buoy during June 20-25, 2002.

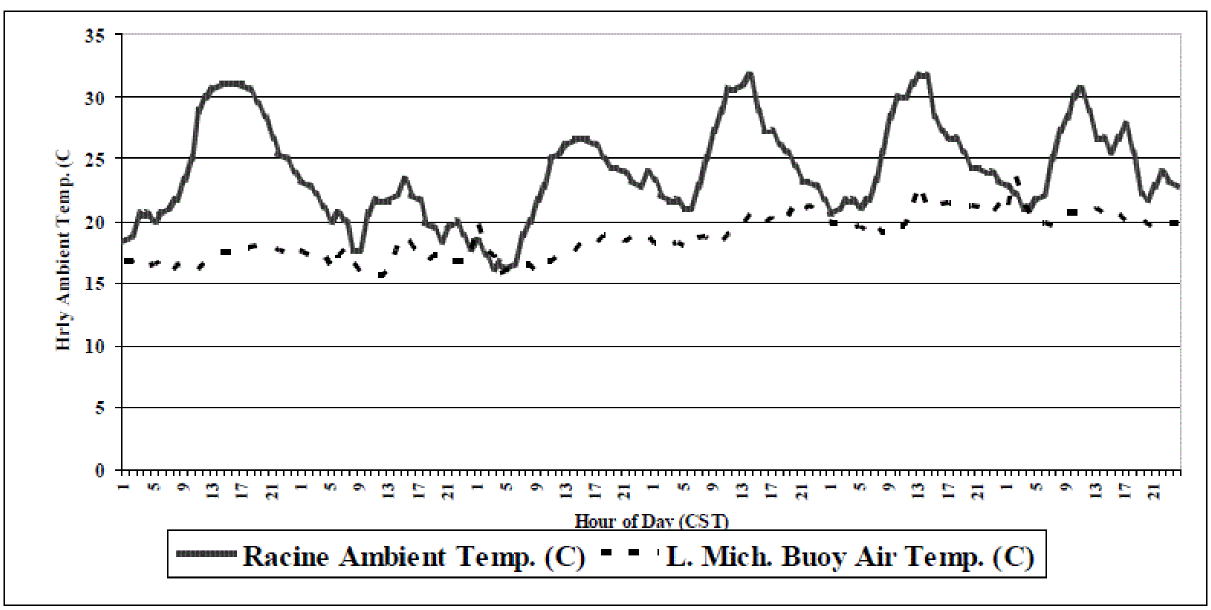
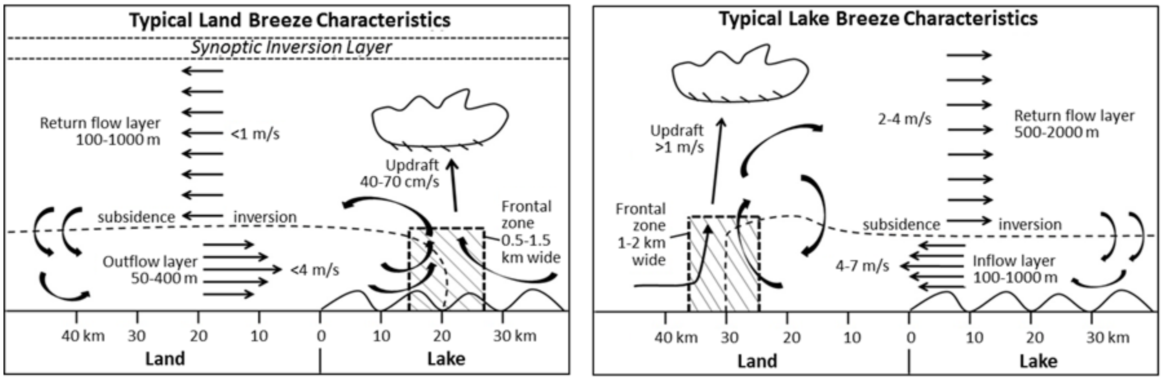


Figure 2.3. Diagrams of the early morning land breeze (left) and late morning/afternoon lake breeze circulations (right) responsible for enhanced ozone production along the Lake Michigan shoreline. Modified from Foley et al., 2011.[10]



2.4. Conceptual Model for Ozone Formation in the Lake Michigan Region

Synoptic and mesoscale meteorological patterns together drive ozone formation in the region, as described in a conceptual model in Dye et al. (1995).[7] Dye et al. (1995) described this model with the following series of inter-related steps. This discussion focuses on the conditions impacting Wisconsin's shoreline:

1) A shallow but stable conduction inversion exists just above the relatively cold lake surface. During the early morning hours the land breeze and general offshore flow (i.e., southerly to west-southwesterly winds) transport ozone and fresh precursor emissions into the stable air in the conduction layer over Lake Michigan. A primary source region is the Chicago area, located at the southern edge of the lake.

2) By midmorning a sharp horizontal temperature gradient forms along the shoreline between the cold lake air and the increasingly warmer air over the land. This gradient effectively "cuts off" air in the conduction layer from additional injections of shore-emitted precursors. Strong stability in the conduction layer limits dispersion, creating high concentrations of ozone precursors, which can react in this layer.

3) By midmorning, the developing convective boundary layer (CBL) grows and the resulting convection mixes ozone vertically, where it combines with ozone transported from sources outside the region. Ozone concentrations in this air are lower due to the dilutive effects of convective mixing. As this air is transported lakeward, it is forced to flow up and over the conduction layer.

4) The ozone-rich air in both layers is transported northward over Lake Michigan by the prevailing winds. When a lake breeze is present, it produces southerly to south-

[10] Foley, T. , E. A. Betterton, P.E. R. Jacko, and J. Hillery, 2011: Lake Michigan air quality: The 1994-2003 LADCO Aircraft Project (LAP), Atmos. Env., 45: 3192-3202.

southeasterly winds along the western shore of Lake Michigan. This wind pattern transports the ozone originating from sources in the south to downwind receptor regions in eastern Wisconsin. On occasion, areas north of Ozaukee County experience elevated ozone levels as a southerly wind intercepts the shoreline where it extends into Lake Michigan.

5) When the ozone-laden air flows onshore in the downwind receptor regions, air with the highest ozone concentrations, located in the lowest 300 m, mixes down to the surface first. This causes the highest ozone concentrations to be found along the shoreline. Eventually, air from higher altitudes mixes down to the surface further inland, but ozone concentrations in this air are lower. This air mass is the remnant of the ozone-diluted CBL air that flowed up and over the conduction layer during the mid-morning hours.

This complex meteorology leads to the high ozone concentrations and persistent nonattainment issues faced by the counties along the Lake Michigan shoreline. The impact of this meteorology on the transport of ozone, NOx, and VOCs to the Milwaukee area is discussed in more detail in Section 5.

3. EMISSIONS INVENTORIES AND DEMONSTRATION OF REASONABLE FURTHER PROGRESS

3.1. Introduction

Sections 172(c)(2) and 182(b)(1) of the CAA require states with ozone nonattainment areas classified as moderate or higher to submit plans that show reasonable further progress (RFP) towards attaining the NAAQS. The EPA's SIP requirements rule for the 2015 ozone NAAQS defines RFP for moderate nonattainment areas as a demonstration that there has been at least a 15% emission reduction between the base year (2017) and the attainment year (2023). Because the Milwaukee nonattainment area has a previously approved 15% VOC rate of progress (ROP) plan (61 FR 11735), the 15% reduction requirement for the 2015 NAAQS can be satisfied with any combination of NOx and VOC reductions. These reductions may come from any SIP-approved or federally promulgated measures implemented after the base year.

Table 3.1 provides a summary of the emission inventories for NOx and VOCs for the Milwaukee 2015 ozone NAAQS nonattainment area. Sections 3.2 and 3.3 present the emission inventories by emissions sector (i.e., point, area, onroad and nonroad) for this area for the base and projected years. These sections also include the supporting methodology used to develop the inventories. Sections 3.4 and 3.5 describe how the state has met its RFP and contingency emissions reduction requirements for the nonattainment area. Section 3.6 covers the enforceable control measures that led to the reductions in NOx and VOC emissions.

Table 3.1. Reduction in Milwaukee nonattainment area NOx and VOC emissions, 2017-2024. Figures in tons per ozone season day.

Pollutant	2017	2023	2024	2017-2023 change	2023-2024 change*
NOx	93.84	73.41	68.28	-22%	-5%
VOC	109.93	92.16	91.59	-16%	-1%
TOTAL	**203.77**	**165.57**	**159.87**	**-19%**	**-3%**

*The % change from 2023 to 2024 was calculated relative to 2017 emissions.

3.2. 2017 Base Year Inventory

The base year (2017) portion of the RFP requirement is a compilation of all anthropogenic sources of NOx and VOCs for an average ozone season day in 2017, incorporating all control programs in place at that time. The WDNR followed the EPA's requirements and guidance to prepare a comprehensive statewide emission inventory of NOx and VOC emissions for 2017. Appendix 1 includes a discussion of the methodology used to estimate sector-specific emissions for 2017 (shown in Table 3.2).

Table 3.2. Milwaukee nonattainment area NOx and VOC emissions for base year 2017. Figures in tons per ozone season day.

County	Pollutant	Point EGU	Point Non-EGU	Area	Onroad	Nonroad	ERCs	Total
Milwaukee	NOx	18.74	2.05	10.78	13.26	7.38	0	52.21
Ozaukee	NOx	1.03	0.76	1.49	1.87	2.51	0	7.67
Racine (p)	NOx	0	0.63	2.40	2.49	1.90	0	7.42
Washington (p)	NOx	0	0.32	1.46	1.94	1.38	0	5.10
Waukesha (p)	NOx	0	1.29	7.18	7.49	5.49	0	21.44
TOTAL	**NOx**	**19.77**	**5.05**	**23.31**	**27.06**	**18.65**	**0**	**93.84**
Milwaukee	VOC	0.65	4.76	34.33	6.73	6.19	0	52.66
Ozaukee	VOC	0.16	0.47	4.72	0.88	1.08	0	7.31
Racine (p)	VOC	0	1.38	7.05	1.25	0.98	0	10.66
Washington (p)	VOC	0	0.49	6.04	0.89	1.02	0	8.42
Waukesha (p)	VOC	0	2.75	19.09	3.72	5.31	0	30.88
TOTAL	**VOC**	**0.81**	**9.85**	**71.23**	**13.46**	**14.58**	**0**	**109.93**

3.3. 2023 & 2024 Projected Inventories

The WDNR developed emissions information to satisfy requirements to submit an attainment year (2023) inventory for NOx and VOCs. Appendix 2 includes information on sector-specific emissions projection methodology. The same approaches were used to project emissions for 2024, which was used to assess attainment contingency requirements. Tables 3.3 and 3.4 show the projected NOx and VOC emissions (in tposd) in 2023 and 2024 by sector.

Table 3.3. Milwaukee nonattainment area NOx and VOC emissions for attainment year 2023. Figures in tons per ozone season day.

County	Pollutant	Point EGU	Point Non-EGU	Area	Onroad	Nonroad	ERCs	Total
Milwaukee	NOx	19.15	1.93	9.29	7.21	5.64	0	43.21
Ozaukee	NOx	0.96	0.44	1.04	1.03	1.65	0	5.11
Racine (p)	NOx	0	0.69	1.86	1.41	1.44	0	5.39
Washington (p)	NOx	0	0.36	1.24	1.06	1.16	0	3.82
Waukesha (p)	NOx	0	1.56	5.89	4.10	4.32	0	15.88
TOTAL	**NOx**	**20.11**	**4.97**	**19.31**	**14.80**	**14.21**	**0**	**73.41**
Milwaukee	VOC	0.68	3.87	28.90	5.26	5.49	0	44.20
Ozaukee	VOC	0.06	0.25	4.17	0.72	0.95	0	6.15
Racine (p)	VOC	0	1.23	5.87	1.03	0.87	0	8.99
Washington (p)	VOC	0	0.45	5.28	0.73	0.95	0	7.42
Waukesha (p)	VOC	0	2.34	15.30	3.03	4.73	0	25.40
TOTAL	**VOC**	**0.74**	**8.14**	**59.51**	**10.77**	**12.99**	**0**	**92.16**

* Includes projections of emissions for both existing sources and new/modified sources.

Table 3.4. Milwaukee nonattainment area NOx and VOC emissions for contingency year 2024. Figures in tons per ozone season day.

County	Pollutant	Point EGU	Point Non-EGU	Area	Onroad	Nonroad	ERCs	Total
Milwaukee	NOx	15.15	1.93	9.46	6.68	5.54	0	38.75
Ozaukee	NOx	0.96	0.44	1.05	0.95	1.56	0	4.97
Racine (p)	NOx	0	0.69	1.87	1.31	1.41	0	5.27
Washington (p)	NOx	0	0.36	1.25	0.98	1.14	0	3.73
Waukesha (p)	NOx	0	1.56	5.96	3.81	4.21	0	15.55
TOTAL	**NOx**	**16.10**	**4.97**	**19.60**	**13.74**	**13.86**	**0**	**68.28**
Milwaukee	VOC	0.47	3.87	28.60	5.26	5.46	0	43.67
Ozaukee	VOC	0.06	0.25	4.19	0.72	0.94	0	6.16
Racine (p)	VOC	0	1.23	5.84	1.04	0.86	0	8.97
Washington (p)	VOC	0	0.45	5.27	0.74	0.94	0	7.41
Waukesha (p)	VOC	0	2.34	15.30	3.05	4.69	0	25.38
TOTAL	**VOC**	**0.53**	**8.14**	**59.20**	**10.82**	**12.90**	**0**	**91.59**

* Includes projections of emissions for both existing sources and new/modified sources.

3.4. Demonstration of Reasonable Further Progress

Because the Milwaukee 2015 ozone NAAQS nonattainment area already met the 15% VOC rate of progress requirement when addressing a prior ozone NAAQS, the required 15% RFP reduction for this plan can come from any combination of NOx and VOC reductions occurring between 2017 and 2023.

The WDNR compared actual emissions from 2017 to emission estimates from the attainment year (2023) for the Milwaukee 2015 ozone NAAQS nonattainment area, as shown in Tables 3.5 and 3.6 and Figure 3.1. NOx emissions are projected to decrease by 22% (20.43 tposd) between 2017 and 2023. The largest reductions in NOx for the 2017–2023 period will come from the onroad mobile sector (12.25 tposd), followed by the nonroad mobile sector (4.44 tposd). VOC emissions are projected to decrease by 16% (17.78 tposd) over this same time period. The largest VOC reductions are from the nonpoint sector (11.71 tposd) followed by the onroad mobile sector (2.69 tposd).

Overall, the combined reduction in NOx and VOC emissions between the base year (2017) and the attainment year (2023) is 19%. This reduction exceeds the required 15% RFP reduction, thereby satisfying RFP requirements for this area.

Table 3.5. Milwaukee nonattainment area NOx emissions by source type. Figures in tons per ozone season day.

Sector	2017	2023	2024	2017-2023 change*	2023-2024 change*
Point - EGU	19.77	20.11	16.10	2%	-20%
Point - Non-EGU	5.05	4.97	4.97	-2%	0%
Area	23.31	19.31	19.60	-17%	1%
Onroad	27.06	14.80	13.74	-45%	-4%
Nonroad	18.65	14.21	13.86	-24%	-2%
ERCs		0.00	0.00	0%	0%
TOTAL	93.84	73.41	68.28	**-22%**	**-5%**

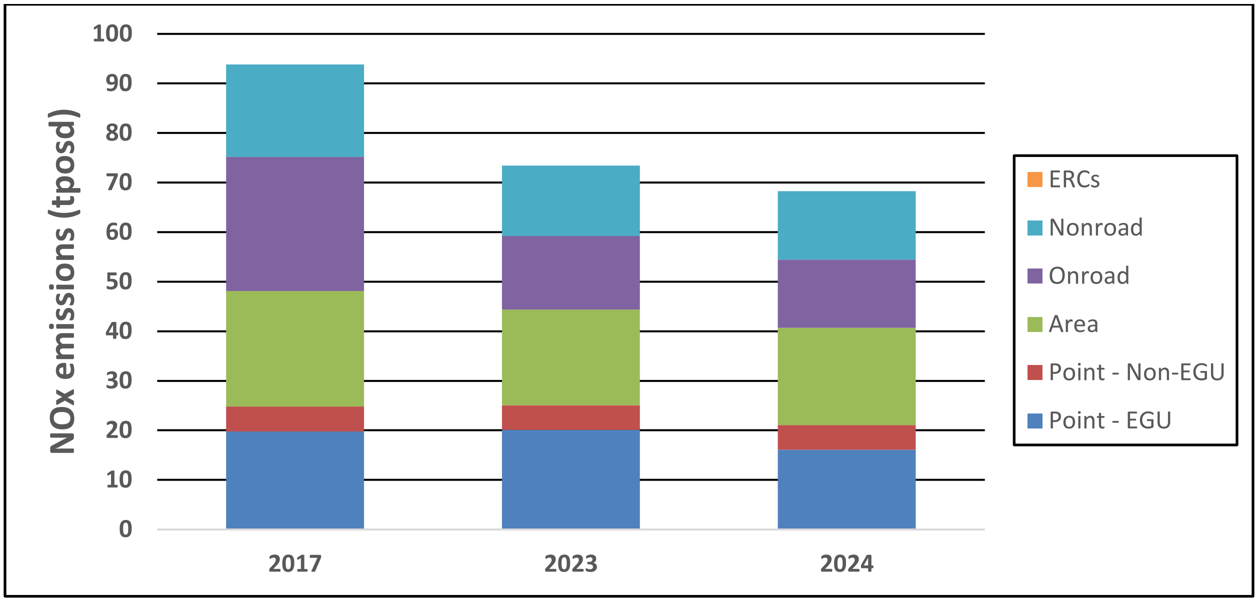
*The percent changes from 2017-2023 and 2023-2024 were calculated relative to 2017 emissions.

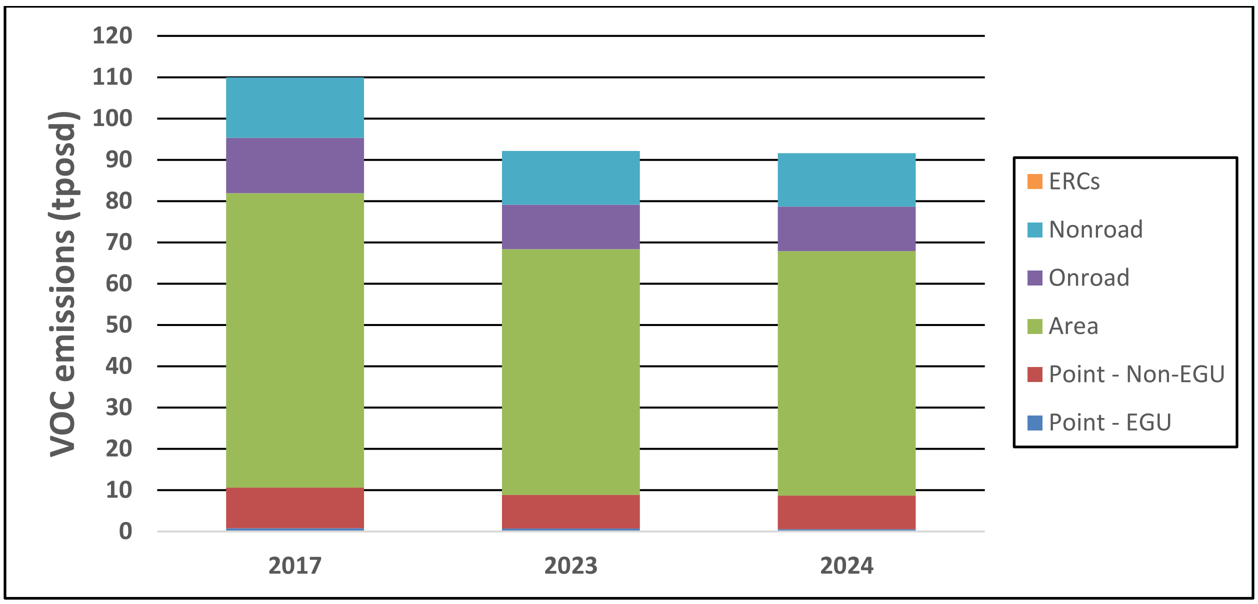
Table 3.6. Milwaukee nonattainment area VOC emissions by source type. Figures in tons per ozone season day.

Sector	2017	2023	2024	2017-2023 change*	2023-2024 change*
Point - EGU	0.81	0.74	0.53	-9%	-26%
Point - Non-EGU	9.85	8.14	8.14	-17%	0%
Area	71.23	59.51	59.20	-16%	0%
Onroad	13.46	10.77	10.82	-20%	4%
Nonroad	14.58	12.99	12.90	-11%	-1%
ERCs		0.00	0.00	0%	0%
TOTAL	109.93	92.16	91.59	**-16%**	**-1%**

*The percent changes from 2017-2023 and 2023-2024 were calculated relative to 2017 emissions.

Figure 3.1. Milwaukee nonattainment area NOx and VOC emissions by source type.





3.5. Demonstration of Contingency Reduction

The state must also include contingency measures representing one year of emissions reduction progress, equivalent to an additional 3% reduction. These measures must be implemented within one year of an area failing to attain the NAAQS by its attainment date (in this case, 2024). This requirement is discussed further in Section 6.7.

Tables 3.5 and 3.6 show that, from 2023 to 2024, NOx emissions are projected to decrease an additional 5% and VOC emissions an additional 1%. Overall, NOx and VOC emissions are expected to decrease by a combined 3% from 2023 to 2024, which meets the contingency reduction target.

Further, these contingency emission reductions are due to permanent and enforceable control measures enacted within the nonattainment area on point, area, and mobile source NOx and VOC emissions described in detail in Section 3.6, below.

3.6. Control Strategies for Ozone Precursor Emissions

This section documents the permanent and enforceable control measures that reduced NOx and VOC emissions in the Milwaukee 2015 ozone NAAQS nonattainment area. Many of the control measures have been implemented under programs that began before 2017.[11] These measures will continue to contribute to emissions reductions that will support attainment of the NAAQS in this area. However, this discussion highlights those control measures and emission reductions that have occurred since 2017. Other federal control programs reducing emissions in both the larger nonattainment area and transport regions are also discussed.

3.6.1. Point Source Control Measures

NOx Reasonably Available Control Measures (RACM) and Reasonably Available Control Technology (RACT)

Wisconsin implemented RACM for NOx sources in the state's nonattainment areas for the 1997 ozone NAAQS. This area included the Milwaukee 2015 ozone NAAQS nonattainment area. The NOx RACM requirements are codified under ss. NR 428.01 to 428.12, Wis. Adm. Code, and apply to new and existing NOx emissions units located in southeastern Wisconsin. Section NR 428.04, Wis. Adm. Code, lists NOx performance standards for the NOx emissions units that are constructed or modified after February 1, 2001, and have design capacities greater than the capacity thresholds listed in this provision. Section NR 428.05 includes NOx performance standards for NOx emissions units constructed on or before February 1, 2001, that exceed the provision's capacity threshold. All emissions units subject to this section are required to install continuous emissions monitoring equipment to demonstrate compliance with the NOx emissions limit specified in this rule.

Wisconsin has also implemented RACT for major NOx sources in nonattainment areas in southeastern Wisconsin to meet requirements for the 1997 ozone NAAQS. This area is inclusive of the entire Milwaukee 2015 ozone NAAQS nonattainment area. Section 6.1 includes details about Wisconsin's NOx RACT program.

In 2023 there were 3,833 tons of NOx from EGUs, and 1,426 tons of NOx from other (non-EGU) emission units in the Milwaukee 2015 ozone NAAQS nonattainment area (Table 3.7). There was a 12% reduction in point source annual NOx emissions in the nonattainment area from 2017 to 2023, and annual point source NOx emissions have decreased by 51% since 2008 (Table 3.7). These reductions are the result of abovementioned NOx RACT and RACM programs, as well as federal emissions standards (e.g., new source performance standards), consent decrees, and NNSR permitting.

[11] Section 5.3 shows emission trends extending back to 2002, with reductions over that period due in part to these control measures.

Table 3.7. NOx emissions and requirements for point sources in the Milwaukee nonattainment area, 2008-2023

Facility	Emissions/ Number of Units	2008	2017	2023	Change 2017 – 2023	Permanent and Enforceable Control Measures
We Energies – Oak Creek Power Plant (FID 241007690)	Annual NOx Emissions (TPY)	4,979	3,988	3,303	-17%	Consent Decree No. 03-C-0371, NOx RACT
We Energies – Valley Power Plant (FID 241007800)	Annual NOx Emissions (TPY)	3,106	254	245	-3.7%	Consent Decree No. 03-C-0371, NOx RACT
We Energies – Port Washington Power Plant (FID 246004000)	Annual NOx Emissions (TPY)	129	229	287	25%	NOx RACT
Other NOx Emissions Units	Annual NOx Emissions (TPY)	2,469	1,474	1,426	-3.3%	-NOx RACM -Emissions units become subject to NOx RACT if facilities exceed major source threshold
	Number of Units	1,128	982	881	-10%	
Total NOx Emissions (TPY)		10,684	5,945	5,259	-12%	

Federal NOx Transport Rules

EGUs in 23 states east of the Mississippi, including Wisconsin, have been subject to a series of federal ozone transport rules since 2009. These rules have included the Clean Air Interstate Rule, the Cross State Air Pollution Rule (CSAPR), the CSAPR Update Rule and the Revised CSAPR Update Rule. These rules have reduced NOx emissions in and around the Milwaukee 2015 ozone NAAQS nonattainment area.

Beginning January 1, 2009, EGUs in 22 states (including Wisconsin) became subject to ozone season NOx emission budgets under CAIR. CAIR addressed CAA transport requirements for the 1997 ozone NAAQS. For the three states contributing most to the Milwaukee 2015 ozone NAAQS nonattainment area ozone concentrations (Illinois, Indiana, and Wisconsin), CAIR resulted in a 35% reduction of total EGU NOx emissions across the three states during the ozone season over the 2009-2014 period (Table 3.8).

Starting with the 2015 ozone season, CSAPR replaced CAIR to reduce interstate NOx transport relative to the 1997 ozone NAAQS. CSAPR implemented NOx budgets for the impacted states in two phases. Phase I limited NOx emissions in 2015 and 2016.

The EPA published the CSAPR Update (81 FR 74504) in 2016 to address NOx transport affecting the attainment and maintenance of the 2008 ozone NAAQS (79 FR 16436). The

CSAPR Update established Phase II NOx budgets starting with the 2017 ozone season. On April 30, 2021, the EPA promulgated the Revised CSAPR Update rule in order to fully address 21 states' outstanding interstate pollution transport obligations for the 2008 ozone NAAQS (86 FR23054). This rule further reduced EGU NOx emissions in 12 states starting in the 2021 ozone season. For the three-state area of Illinois, Indiana, and Wisconsin, these CSAPR rules (CSAPR, CSAPR Update and Revised CSAPR Update) resulted in a 39% reduction of total EGU NOx emissions across the three states during the ozone season over the 2014-2017 period, and a 54% reduction over the 2017-2023 period (Table 3.8).

On June 5, 2023, the EPA published the Good Neighbor Plan (GNP) to address 23 states' interstate pollution transport obligations for the 2015 ozone NAAQS (88 FR 36654). On February 16, 2024, the EPA proposed a supplemental rule to address transport requirements for an additional five states (89 FR 12703). These rules are intended to reduce EGU NOx emissions in starting in the 2023 ozone season and reduce non-EGU NOx emissions in many states starting in the 2026 ozone season. Implementation of the GNP is currently stayed and no emissions reductions from any EPA transport rule for the 2015 NAAQS are reflected in this attainment plan.

Table 3.8. EGU NOx emissions under the CAIR and CSAPR programs in Illinois, Indiana, and Wisconsin.

State	Ozone Season NOx Emissions (Tons)				Percent Reduction		
	2008	2014	2017	2023	2008-2014	2014-2017	2017-2023
Illinois	31,106	18,489	13,039	5,365	41%	29%	59%
Indiana	53,016	40,247	20,396	8,694	24%	49%	57%
Wisconsin	19,951	9,087	8,103	5,198	55%	11%	36%
Total	**104,073**	**67,823**	**41,538**	**19,257**	**35%**	**39%**	**54%**

Source: EPA Clean Air Markets Program Data (CAMPD), database of reported emissions, for 2008-2023 ozone season emissions.

<u>Point Source VOC Control Measures</u>

In 2023, non-combustion processes accounted for the majority (83%) of total VOC emissions in the Milwaukee 2015 ozone NAAQS nonattainment area (Table 3.9). On a county level, non-combustion processes accounted for 75% to 94% of VOC emissions from within the five-county nonattainment area. Examples of non-combustion processes include printing, coating, painting, and storage tank emissions. Combustion processes related to boilers, process heaters, and reciprocating engines, accounted for the remaining 17% of the area's VOC emissions in 2023.

Sources of VOC emissions in the Milwaukee 2015 ozone NAAQS nonattainment area are subject to source-specific NESHAP requirements and/or VOC RACT rules, as applicable.[12]

Table 3.9. Process-level VOC emissions from the Milwaukee nonattainment area in 2023.

Area	Combustion Processes (2023 tons)	Non-Combustion Processes (2023 tons)
Milwaukee County	323	1,002
Ozaukee County	22	67
Racine County (p)	26	337
Washington County (p)	19	111
Waukesha County (p)	39	626
Total	**429**	**2,142**
Percent of total	17%	83%

VOC RACT Rules

Non-combustion activities or processes in the Milwaukee 2015 ozone NAAQS nonattainment area are subject to Wisconsin VOC RACT rules. Section 6.2 includes details about VOC RACT program implementation in this nonattainment area.

Federal NESHAP Rules

Several federal NESHAP rules have been implemented to control hazardous pollutants. These rules include requirements to control hazardous organic pollutants through ensuring complete combustion of fuels or implementing requirements for emissions of total hydrocarbons. Under either approach, the rules act to reduce total VOC emitted by the affected sources. These NESHAP rules apply to both major and area source facilities. Major sources are those facilities emitting more than 10 tons per year of a single hazardous air pollutant or more than 25 tons per year of all hazardous air pollutants in total. Area sources are those facilities that emit less than the major source thresholds for hazardous air pollutants.

NESHAP requirements apply to sources within the Milwaukee 2015 ozone NAAQS nonattainment area but also apply nationally, thereby reducing the transport of VOC emissions into the nonattainment area. The NESHAP rules that may have contributed to reductions in point source VOC emissions include:

- *Major Source ICI Boiler and Process Heater NESHAP* – On March 21, 2011, the EPA promulgated the "National Emission Standards for Hazardous Air Pollutants for Major

[12] Non-combustion and combustion processes are subject to either major source or area source NESHAP emission requirements based on size thresholds. The applicability of requirements and exemptions for each process has not been determined for purposes of this assessment. Natural gas-fired boilers and processes at area sources are not subject to NESHAP requirements.

Sources: Industrial, Commercial, and Institutional Boilers and Process Heaters" under part 63 subpart DDDDD. This NESHAP requires all boilers and process heaters, including natural gas fired units, at major source facilities to perform an initial energy assessment and perform periodic tune-ups by January 31, 2016. This action is intended to ensure complete combustion.

- *Area Source (non-major point sources) ICI Boiler and Process Heater NESHAP* – On March 21, 2011, the EPA promulgated the "National Emission Standards for Hazardous Air Pollutants for Area Sources: Industrial, Commercial, and Institutional Boilers" under part 63 subpart JJJJJJ. This NESHAP requires solid fuel and oil fuel fired boilers operated by sources that are below the major source threshold to begin periodic combustion tuning by March 21, 2014.

- *Internal Combustion Engine Rules* – The EPA has promulgated three rules which limit the total amount of hydrocarbon emissions from internal combustion engines - the "National Emission Standards for Hazardous Pollutants for Reciprocating Internal Combustion Engines" (RICE MACT) was promulgated on June 15, 2004 under Part 63, subpart ZZZZ and revised in January 2008 and March 2010, with the two revisions impacting additional RICE units; the "Standards of Performance for Stationary Spark Ignition Internal Combustion Engines" promulgated on January 18, 2008 under Part 60, subpart JJJJ; and "Standards of Performance for Stationary Compression Ignition Internal Combustion Engines promulgated on July 11, 2006 under Part 60, subpart IIII. These rules implement hydrocarbon emission limitations prior to and after 2011 based on compliance dates. These rules also act to continuously reduce emissions as existing stationary engines are replaced by new, cleaner-burning engines.

3.6.2. Area Source Control Measures

As noted for point sources, Wisconsin has implemented VOC RACT rules under chs. NR 420 through 423, Wis. Adm. Code, that are aligned with the EPA's CTGs. Wisconsin has also adopted VOC limits for source categories not covered by CTGs throughout chs. NR 419 through 424, Wis. Adm. Code. In addition, VOC emissions standards for consumer and commercial products also limited VOC emissions from area sources, as did NESHAPs for gasoline distribution (Stage I vapor recovery requirements) and area source ICI boilers.

Wisconsin previously had a Stage 2 vehicle refueling vapor recovery program in place. However, this program was removed from Wisconsin's ozone SIP on November 4, 2013 (78 FR 65875) because the equipment was found to defeat onboard vapor recovery systems for some new vehicles.

There are also federal programs in place which reduce area source VOC emissions. VOC emission standards for consumer and commercial products were promulgated under 40 CFR Part 59. This program was implemented prior to 2017 and will continue to reduce VOCs emitted from this sector. Two other federal rules, the NESHAPs for gasoline distribution (Stage I vapor recovery requirements) and area source ICI boilers, also control area source VOC emissions associated with fuel storage and transfer activities.

3.6.3. Onroad Source Control Measures

Both NOx and VOC emissions from onroad mobile sources are substantially controlled through federal new vehicle emissions standards programs and fuel standards. Although initial compliance dates in many cases were prior to 2017, these regulations have continued to reduce area-wide emissions as fleets turn over to newer vehicles. These programs apply nationally and have reduced emissions both within the Milwaukee 2015 ozone NAAQS nonattainment area and contributing ozone precursor transport areas. The federal programs contributing to attainment of the 2015 ozone NAAQS include those listed in Table 3.10.

The EPA has recently finalized a series of updated mobile source rules that will further reduce emissions from this sector. However, since those reductions will occur in the future and after the moderate attainment date for this NAAQS, no emissions reductions from those and other mobile source programs (e.g., from the Inflation Reduction Act) implemented after 2023 are reflected in this attainment plan.

Table 3.10. Federal onroad mobile source regulations contributing to attainment.

Onroad Control Program	Pollutants	Model Year[1]	Regulation
Passenger vehicles, SUVs, and light duty trucks – emissions and fuel standards	VOC & NOx	2004 – 2009+ (Tier 2) 2017+ (Tier 3)	40 CFR Part 85 & 86
Light-duty trucks and medium duty passenger vehicle – evaporative standards	VOC	2004 – 2010	40 CFR Part 86
Heavy-duty highway compression engines	VOC & NOx	2007+	40 CFR Part 86
Heavy-duty spark ignition engines	VOC & NOx	2005 – 2008+	40 CFR Part 86
Motorcycles	VOC & NOx	2006 – 2010 (Tier 1 & 2)	40 CFR Part 86
Mobile Source Air Toxics – fuel formulation, passenger vehicle emissions, and portable container emissions	Organic Toxics & VOC	2009 - 2015[2]	40 CFR Part 59, 80, 85, & 86
Light duty vehicle corporate average fuel economy (CAFE) standards	Fuel efficiency (VOC and NOx)	2012-2016 & 2017-2025	40 CFR Part 600

[1] The range in model years affected can reflect phasing of requirements based on engine size or initial years for replacing earlier tier requirements.
[2] The range in model years reflects phased implementation of fuel, passenger vehicle, and portable container emissions requirements as well as the phasing by vehicle size and type.

The CAA has required the use of reformulated gasoline (RFG) in the southeast Wisconsin counties of Kenosha, Milwaukee, Ozaukee, Racine, Washington, Waukesha since 1995 (42 U.S.C. 7545(k)(10)(D)). RFG is blended to burn more cleanly than conventional gasoline and offers incremental emissions reductions as newer vehicles replace older vehicles. For example, in 2022, RFG reduced emissions of VOCs by 7.3% and NOx by 6.0% from gasoline-powered onroad vehicles in this six-county area.[13]

[13] When compared to conventional gasoline use. Calculated using MOVES3.0.3.

Wisconsin's enhanced I/M program also limits on-road VOC and NOx emissions from onroad sources and is required within the Milwaukee 2015 ozone NAAQS nonattainment area. Section 6.5 includes a description of the I/M program.

3.6.4. Nonroad Source Control Measures

VOC and NOx emitted by nonroad mobile sources are significantly controlled via federal standards for new engines. These programs therefore reduce ozone precursor emissions generated within the Milwaukee 2015 ozone NAAQS nonattainment area and in the broader regional areas contributing to ozone transport. Table 3.11 lists the nonroad source categories and applicable federal regulations. The nonroad regulations continue to slowly lower average unit and total sector emissions as equipment fleets are replaced each year (approximately 20 years for complete fleet turnover) pulling the highest emitting equipment out of circulation or substantially reducing its use. The new engine tier requirements are implemented in conjunction with fuel programs regulating fuel sulfur content. The fuel programs enable achievement of various new engine tier VOC and NOx emission limits. The RFG program also contributes to lower NOx and VOC emissions from the nonroad mobile sector.

Table 3.11. Federal nonroad mobile source regulations contributing to attainment.

Nonroad Control Program	Pollutants	Model Year[1]	Regulation
Aircraft	HC & NOx	2000 – 2005+	40 CFR Part 87
Compression Ignition[2]	NMHC & NOx	2000 – 2015+ (Tier 4)	40 CFR Part 89 & 1039
Large Spark Ignition	HC & NOx	2007+	40 CFR Part 1048
Locomotive Engines	HC & NOx	2012 – 2014 (Tier 3) 2015+ (Tier 4)	40 CFR Part 1033
Marine Compression Ignition	HC & NOx	2012 – 2018	40 CFR Part 1042
Marine Spark Ignition	HC & NOx	2010+	40 CFR Part 1045
Recreational Vehicle[3]	HC & NOx	2006 – 2012 (Tier 1 – 3) (phasing dependent on vehicle type)	40 CFR Part 1051
Small Spark Ignition Engine[4] < 19d Kw – emission standards	HC & NOx	2005 – 2012 (Tier 2 & 3)	

HC – Hydrocarbon (VOCs)
NMHC – Non-Methane Hydrocarbon (VOCs)
[1] The range in model years affected can reflect phasing of requirements based on engine size or initial years for replacing earlier tier requirements.
[2] Compression ignition applies to diesel non-road compression engines including engines operated in construction, agricultural, and mining equipment.
[3] Recreational vehicles include snowmobiles, off-road motorcycles, and ATVs
[4] Small spark ignition engines include engines operated in lawn and hand-held equipment.

4. ATTAINMENT MODELING

Section 182(j) of the CAA requires that photochemical grid modeling be used to demonstrate attainment in multistate ozone nonattainment areas. In this plan, the WDNR is including modeling conducted by the Lake Michigan Air Directors Consortium (LADCO) to satisfy this requirement for the Milwaukee 2015 ozone NAAQS moderate nonattainment area.

4.1. Overview

In 2022 LADCO completed air quality modeling to support the development of attainment demonstration SIPs for 2015 ozone NAAQS moderate nonattainment areas for its member states. The resulting technical support document (TSD) includes an ozone trends analysis, air quality modeling platform description, base and future year emissions summary, chemical transport modeling evaluation, attainment testing, and source apportionment analysis. The TSD is included as Appendix 9 to this document. This section summarizes the methods and results of that analysis.[14]

LADCO's modeling used the Comprehensive Air Quality Model with Extensions (CAMx) v7.10. Because the attainment deadline occurs during the 2024 ozone season, the effective year for attainment is the 2023 ozone season. Therefore, LADCO selected 2023 as the projection year for this modeling effort. LADCO used 2016 as the base modeling year from which it projected air quality for 2023.

The modeling's 2023 ozone air quality and attainment forecasts were based on meteorological modeling that was optimized for conditions around the Great Lakes. LADCO used the EPA's 2016fh_16j emissions modeling platform data (2016v1), and other CAMx modeling platform inputs released by the EPA in September 2019 for this application. LADCO replaced the EGU emissions in the EPA 2016fh_16j platform with 2023 EGU forecasts estimated with the ERTAC EGU Tool version 16.2 beta. Overall, both the NOx and VOC ozone season emissions are projected to decrease in 2023 relative to 2016 in all LADCO states, including Wisconsin.

LADCO's modeling differs from contemporaneous EPA ozone modeling[15] in that LADCO relies upon different emissions data and, especially, a photochemical modeling configuration optimized to best reflect ground-level ozone formation in the Great Lakes region. However, the LADCO and EPA modeling efforts are consistent in their core respects and give similar results. The LADCO TSD includes a full model performance evaluation and a discussion of the differences between the EPA and LADCO modeling.

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[14] All technical files associated with this modeling are publicly available on LADCO's website: https://www.ladco.org/technical/ladco-internal/ladco-projects/ladco-2015-o3-naaqs-moderate-area-sip-technical-support-document/.

[15] See, for example, modeling completed by the EPA for both the proposed and final Good Neighbor Plan rule for the 2015 ozone NAAQS (2016v2 and 2016v3 platform modeling), available at: https://www.epa.gov/Cross-State-Air-Pollution/good-neighbor-plan-2015-ozone-naaqs.

4.2. Modeling Results

An attainment demonstration based on air quality modeling is used to determine whether identified emission reduction measures are enough to reduce projected pollutant concentrations to a level that meets the NAAQS by the statutory deadline established by the EPA.

LADCO estimated 2023 design values using version 1.6 of the Software for Modeled Attainment Test Community Edition (SMAT-CE) using the EPA's recommended approach and guidance.[16] This software computes the fractional changes, or relative response factors, of ozone concentrations at each monitor location based on a comparison of the modeled air quality in the base and future years. Meteorological conditions are assumed to be unchanged for the base and projection years. Modeled relative reduction factors are then applied to a weighted baseline 2017 design value, which is determined by averaging three successive three-year design values centered on 2017 (i.e., 2015-2017, 2016-2018, 2017-2019). The resulting estimates of design values in 2023 can then be compared to the level of the NAAQS to assess attainment.

Table 4.1 gives the results of this modeling for the attainment year of 2023 for all monitors in the Milwaukee 2015 ozone NAAQS nonattainment area. As indicated by the table, all monitoring locations in the nonattainment area were projected to meet the 2015 ozone NAAQS in 2023, with projected design values ranging from 60 ppb (Waukesha) to 69 ppb (Racine). This modeling therefore predicted that the Milwaukee area would attain the 2015 ozone NAAQS of 70 ppb by 2023.

Table 4.1. Modeled 2023 ozone design values for the Milwaukee nonattainment area.*

Site #	Monitor name	County	Modeled 2023 design value (ppb)
550790010	Milwaukee-16th St	Milwaukee	61.0
550790026	Milwaukee-SER DNR	Milwaukee	63.1
550790085	Bayside	Milwaukee	66.5
550890008	Grafton	Ozaukee	66.0
550890009	Harrington Beach	Ozaukee	68.7
551010020	Racine-Payne & Dolan	Racine	69.5
551330027	Waukesha	Waukesha	60.5

* From LADCO's modeling TSD for the 2015 ozone standard, Table 6-1 ("2023 DVF Average" values), as well as LADCO's attainment test results, which can be found on LADCO's website (https://www.ladco.org/wp-content/uploads/Projects/Ozone/ModerateTSD/LADCO_2016bcc2_2023_O3_DVs_25May2022.xlsx). Design values are average 2023 values calculated from the LADCO 4-km CAMx modeling with water cells included in the 3x3 matrix surrounding each monitor. The TSD contains a complete explanation of results.

However, as will be discussed in Section 5, the area's actual design values in 2023 exceeded the NAAQS (Table 5.1). The WDNR has included additional information in Section 5 describing

[16] See https://www3.epa.gov/ttn/scram/guidance/guide/O3-PM-RH-Modeling_Guidance-2018.pdf. As discussed in Section 5, a design value is the three-year average of the annual fourth highest 8-hour averaged daily ozone value.

how ozone-causing emissions continue to decrease in Wisconsin but, due to emissions transported from out of state, the Milwaukee area has not yet attained the standard.

5. AIR QUALITY AND WEIGHT OF EVIDENCE ANALYSES

5.1. Introduction

The EPA recommends that states submit supplemental analyses in support of any attainment plan. These analyses are intended to provide additional support for the required modeled attainment assessment. Such supplemental analyses are part of a "weight of evidence" showing that an area will attain a standard. This section presents trends in ambient ozone and ozone precursor concentrations and forms the core of such a showing relative to the Milwaukee 2015 ozone NAAQS nonattainment area.

Ozone concentrations in the Milwaukee area are largely determined by a number of factors that are outside of the state's control. Crucially, much of the ozone measured in Milwaukee comes from transported ozone and ozone precursors originating in upwind states. Wisconsin sources that impact the area are already well-controlled and contribute very little to the elevated ozone concentrations. Modeling conducted by both LADCO and the EPA confirms that Wisconsin has limited ability to further reduce ozone concentrations in this area.

5.2. Air Quality Data and Trends

5.2.1. Trends in Monitored Ozone Concentrations

Section 110(a)(2)(B) of the CAA requires a monitoring strategy for measuring, characterizing, and reporting ozone concentrations in the ambient air. The WDNR maintains a comprehensive network of air quality monitors throughout the state with the primary objective of being able to determine compliance with NAAQS.[17] Wisconsin conducts seasonal monitoring of ambient ozone concentrations from April 1 through October 15.[18]

The current ozone monitoring network in the Milwaukee nonattainment area is depicted in Figure 1.1. There are seven monitors measuring ozone concentrations in the area, all of which are used to determine compliance with the 2015 ozone NAAQS.

An exceedance of an 8-hour ozone NAAQS occurs when a monitor measures ozone concentrations above the standard. A violation occurs when the three-year average of the annual fourth highest 8-hour averaged daily ozone level is greater than a standard. This three-year average is termed the "design value" for the monitor. The design value for a nonattainment area is derived from the monitor with the highest design value.

Table 5.1 shows ozone ambient air quality monitoring data for monitors in the Milwaukee area for the last six years, concluding with the most recent 2021-2023 design value period. This data

[17] The latest state air quality monitoring network plan can be found at: https://dnr.wisconsin.gov/topic/AirQuality/Monitor.html.
[18] Except for Kenosha County, which monitors ozone from March 1 through October 31 to align with monitoring requirements applicable to the tristate Chicago nonattainment area.

shows that the area continues to experience nonattainment levels, even if design values decreased in some locations before experiencing an uptick in values in 2021-2023.

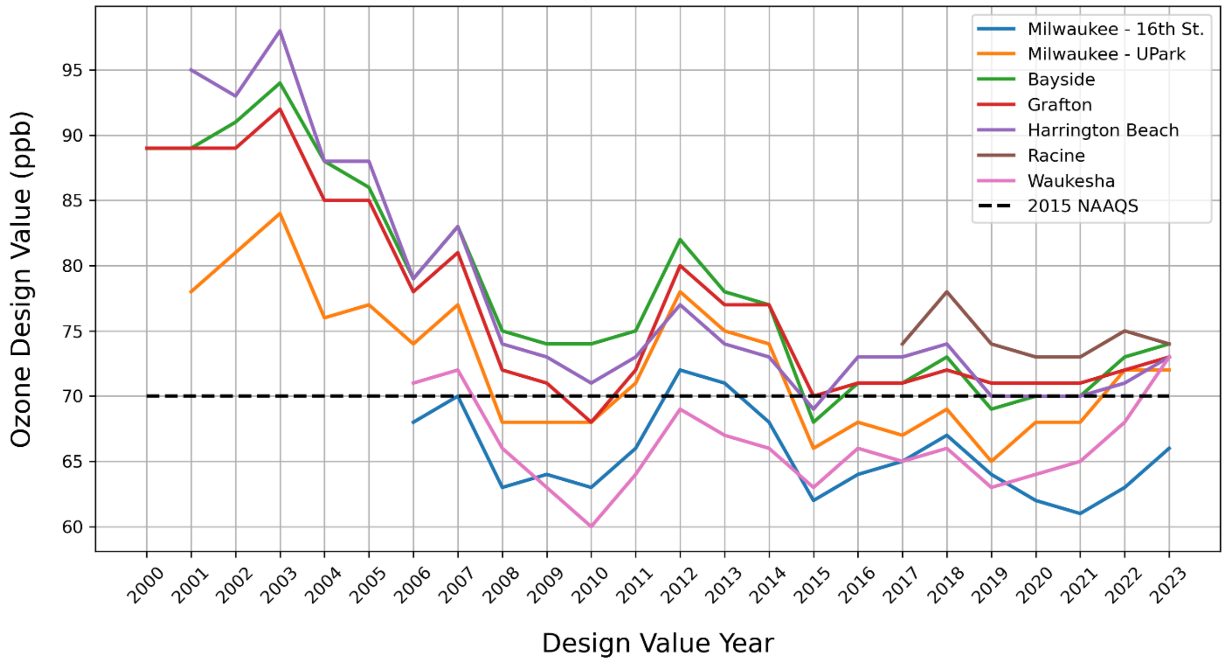
Table 5.1. Ozone design values in the Milwaukee nonattainment area, 2018-2023.

Site #	Monitor name	County	Design value (ppb)					
			2016-18	2017-19	2018-20	2019-21	2020-22	2021-23
550790010	Milwaukee-16th St	Milwaukee	67	64	*	61	63	66
550790026	Milwaukee-UWM UPark**	Milwaukee	69	65	68	68	72	72
550790085	Bayside	Milwaukee	73	69	70	70	73	74
550890008	Grafton	Ozaukee	72	71	71	71	72	73
550890009	Harrington Beach	Ozaukee	74	70	70	70	71	73
551010020	Racine-Payne & Dolan	Racine	78	74	73	73	75	74
551330027	Waukesha	Waukesha	66	63	64	65	68	73

* No data
** Milwaukee SER was replaced with Milwaukee UWM UPark on April 4th, 2021 - datasets are combined thereafter. Milwaukee-UPark site ID is changed from 55-079-0026 to 55-079-0068 in 2022.

Recent ozone measurements obscure the long-term air quality trends in the Milwaukee area, which show a significant decrease in ozone values since 2000 (Figure 5.1). Design values in this area decreased from 78-98 ppb before 2004 to 66-74 ppb in 2023. The largest reductions occurred during the early years of this period, with the average design value decreasing by 23 ppb from 2003 to 2009. Despite continuing reductions of regional emissions, a leveling out of ozone values has been observed in more recent years. The uptick in values in 2023 is due in part to the influence of Canadian wildfires that year.

Figure 5.1. Trends in ozone design values for monitors in the Milwaukee 2015 ozone NAAQS nonattainment area.



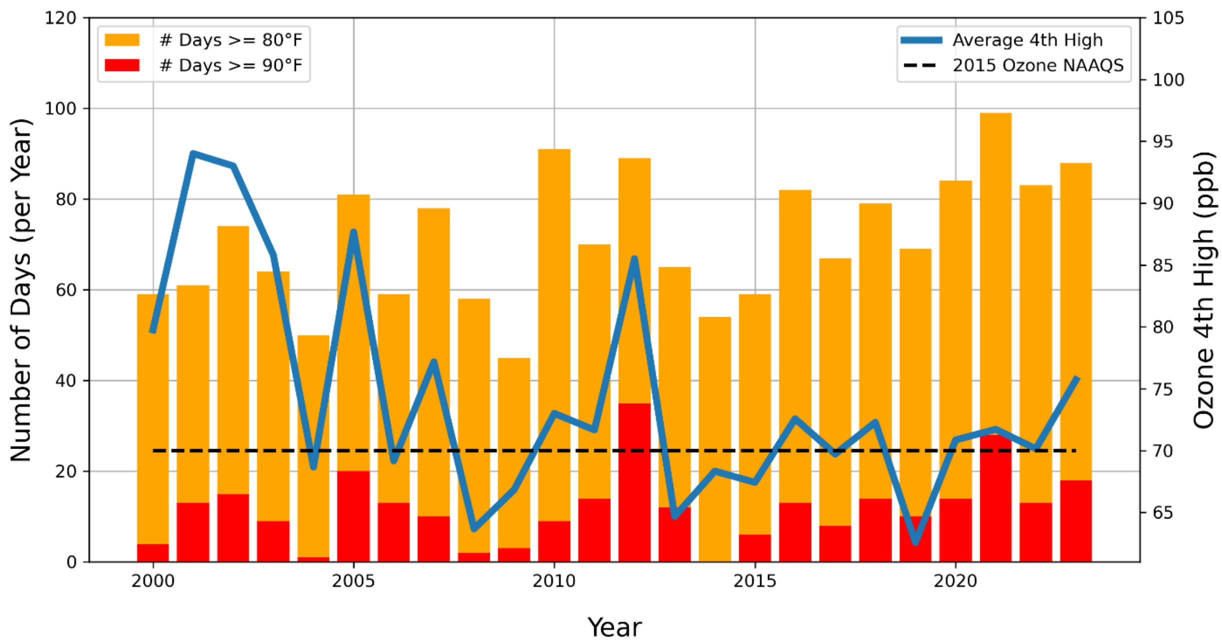
Meteorological variability significantly affects ozone concentrations and can obscure trends over shorter time periods. For example, 2012 had an extremely hot summer with a high frequency of elevated ozone concentrations, while 2008, 2009 and 2015 had relatively cool summers with a lower frequency of elevated ozone concentrations. The next two sections discuss the impact of meteorology on ozone concentrations and describe how ozone concentrations in this area have decreased even after considering the impacts of meteorology.

5.2.2. Influence of Temperature on Ozone Concentrations

Temperature is an important and well-known driver of ozone formation, with more ozone being produced at high temperatures than at low temperatures. Figure 5.2 compares annual fourth high MDA8 concentration averages across the Milwaukee 2015 ozone NAAQS nonattainment area with temperature measurements at the Milwaukee Mitchell Airport. The count of days in which maximum temperatures reached 80–90+°F indicate how often extreme temperatures occurred each year.

The correlations between ozone concentrations and elevated temperature are shown in Figure 5.2. While the highest ozone concentrations occurred in years with the highest temperatures, the amount of ozone produced for a given temperature level has decreased over time. For example, comparison of the years 2002, 2012, and 2021 shows that the average fourth high MDA8 value steadily decreased between decades (96.6 ppb, 86.1 ppb, and 71.7 ppb for 2002, 2012, and 2021, respectively) even though temperatures were similar in those years. These reductions are presumably due to reduced emissions of ozone precursors, analyzed further in the following section.

Figure 5.2. Comparison of Milwaukee area ozone values to temperature, 2000-2023. Average annual fourth high maximum daily 8-hour average (MDA8) ozone concentrations plotted with the number of days with temperatures above 80 °F and 90 °F at Milwaukee Mitchell Airport.[19]



5.2.3. Ozone Trends Adjusted for Meteorology

Because of the large effect of meteorology, particularly temperature, on ozone concentrations, meteorologically driven variability in ozone concentrations often obscures trends in ozone due to factors such as permanently reduced rates of precursor emissions. For this reason, it is important to adjust ozone concentrations for meteorology to examine trends in ozone concentrations due to precursor emission reductions and other factors. The following analysis shows that when adjusted for meteorology, ozone concentrations in the Milwaukee 2015 ozone NAAQS nonattainment area are continuing to decrease.

<u>LADCO CART Analysis</u>

Classification and Regression Tree (CART) analysis allows ozone concentrations on days with similar meteorological conditions to be compared. This analysis partially controls for the influence of year-to-year meteorological variability on ozone concentrations. A CART analysis produces average ozone concentrations for several different classes of days (determined by meteorology) for each year being assessed. This analysis therefore allows examination of average ozone concentration trends over long periods resulting from non-meteorological factors, including permanent and enforceable reductions in emissions of ozone precursors impacting the area of interest.

[19] Climatological data is from the Midwestern Regional Climate Center "cli-MATE" database (https://mrcc.purdue.edu/CLIMATE/).

In 2021, LADCO completed a CART analysis for regional nonattainment and maintenance areas to assess changes in ozone concentrations under different meteorological conditions from 2006-2020 (note that this timeframe incorporates a period predating the 2015 standard).[20]

Results for the Milwaukee Area

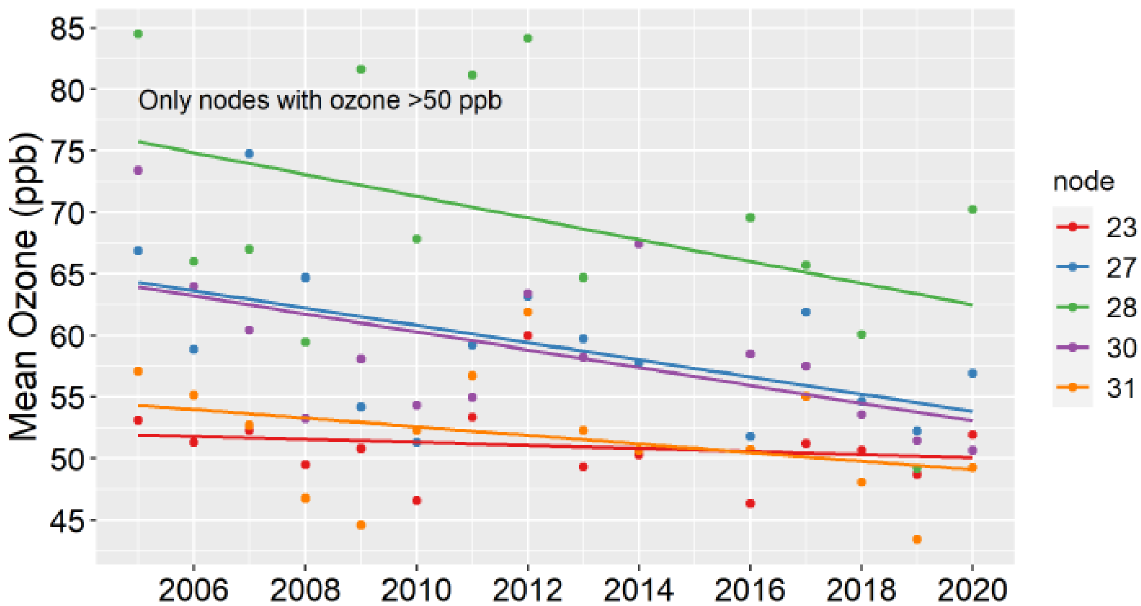
From the LADCO CART analysis, Figure 5.3 shows average ozone concentrations for the five sets of meteorological conditions ("nodes") that resulted in the highest ozone concentrations for five monitors in the Milwaukee 2015 ozone NAAQS nonattainment area.[21]

The data shown for each node are the average ozone concentrations on all days sharing a particular set of meteorological conditions.[22] The analysis shows that high-ozone days in this area generally are associated with hot temperatures and southerly winds. The highest ozone node also has winds that are either weak from the west or from the east. Southerly transport- and temperature-related variables are the most important variables associated with ozone in this area. Mean ozone concentrations in all of the high-ozone nodes have decreased from 2005 to 2020.

Critically, this analysis shows that average ozone concentrations decreased under all assessed meteorological conditions over this period. This suggests that the observed, long-term decreases in average ozone concentrations on days when meteorology favors ozone production are due, at least in part, to permanent and enforceable reductions in ozone precursors.

[20] LADCO. Classification and Regression Tree (CART) Analysis for LADCO Ozone Nonattainment Areas Memorandum (October 2021) available at: https://www.ladco.org/wp-content/uploads/Projects/Ozone/LADCO_O3_CART-Analysis_27Oct2021-FINAL-with-Appendices.pdf.
[21] The Milwaukee-16th Street, Milwaukee SER/UWM UPark, and Bayside monitors in Milwaukee County, and the Grafton and Harrington Beach monitors in Ozaukee County.
[22] For example, Node 28 in Figure 5.3 shows the average ozone concentrations for days characterized by maximum temperatures above 83 °F, average southerly winds greater than 3.1 m/s and average afternoon winds of less than 2.0 m/s from the west.

Figure 5.3. CART analysis results for the Milwaukee area, 2005-2020. Data points show the average ozone concentration for days sharing certain meteorological conditions ("nodes"). Node criteria are described below the figure. Only meteorological nodes with an average ozone concentration above 50 ppb are shown. Analysis included three Milwaukee County and two Ozaukee County monitors.[23]



Node 28	Node 27	Node 30	Node 31	Node 23
72 ppb O_3	60 ppb O_3	59 ppb O_3	51 ppb O_3	51 ppb O_3
Maximum Temp >83 °F	Maximum Temp >78 & <83 °F	Maximum Temp >78 °F	Maximum Temp >78 °F	Maximum Temp >82 °F
PM southerly winds >3.1 m/s	PM southerly winds >3.1 m/s	PM southerly winds >3.1 m/s	PM southerly winds >3.1 m/s	PM southerly winds <3.1 m/s
PM westerly winds <2.0 m/s	PM westerly winds <2.0 m/s	PM westerly winds >2.0 m/s	PM westerly winds >2.0 m/s	Average wind direction <234° (southwesterly to easterly)
		Midday RH <48%	Midday RH >48%	

5.3. Emissions Data and Trends

Ozone is formed from the reaction of NOx and VOCs in the presence of sunlight. Ozone formation involves a number of different reactions. Partly because of the interactions between these different reactions, rates of ozone formation often respond non-linearly to reductions in ozone precursor concentrations. For example, under some circumstances, ozone formation may be NOx-limited, such that reductions in NOx emission cause reductions in ozone concentrations. Conversely, in some cases ozone formation may be VOC-limited, in which case additional VOC reductions will lower ozone.

[23] Taken from LADCO's 2021 CART analysis memorandum, Appendix 8.

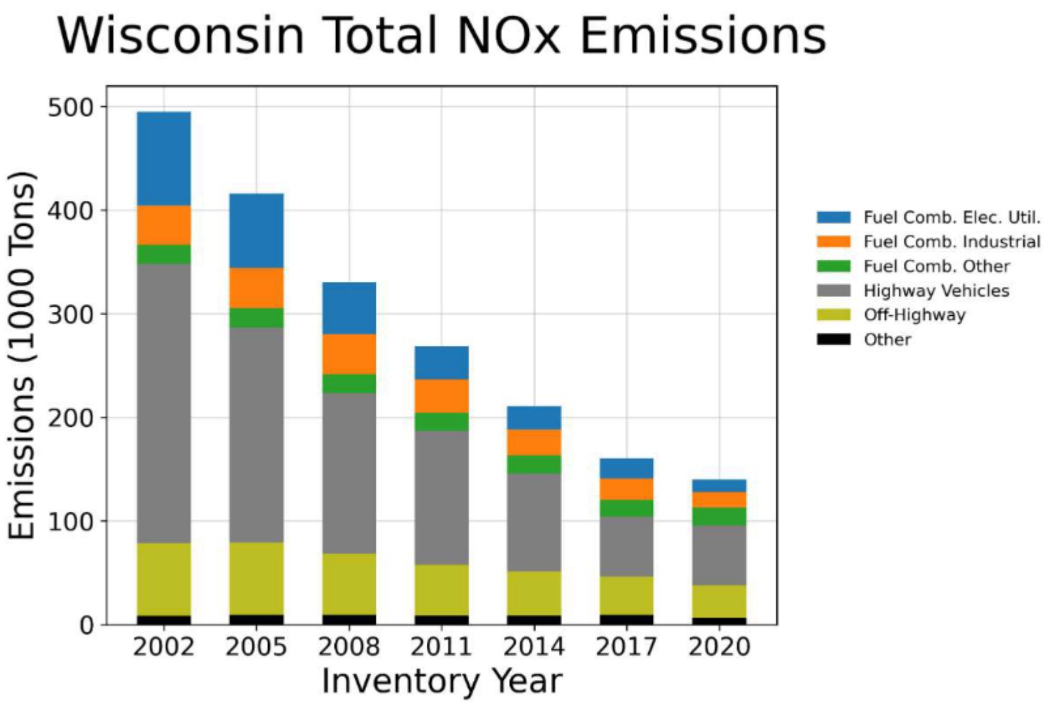
Ozone formation in most of the Midwest is currently understood to be NOx-limited.[24] The primary exception to this is in large urban centers (such as Chicago), where the ozone chemistry is such that ozone formation is limited by the concentrations of VOCs. Recent analyses have indicated that Milwaukee may be a "transitional" area, meaning that both NOx and VOC emissions reductions would result in lower ozone concentrations. Because of this complex chemistry and its impacts on specific geographic areas, approaches to decreasing ozone concentrations in the region have historically relied on reductions in both NOx and VOC emissions.

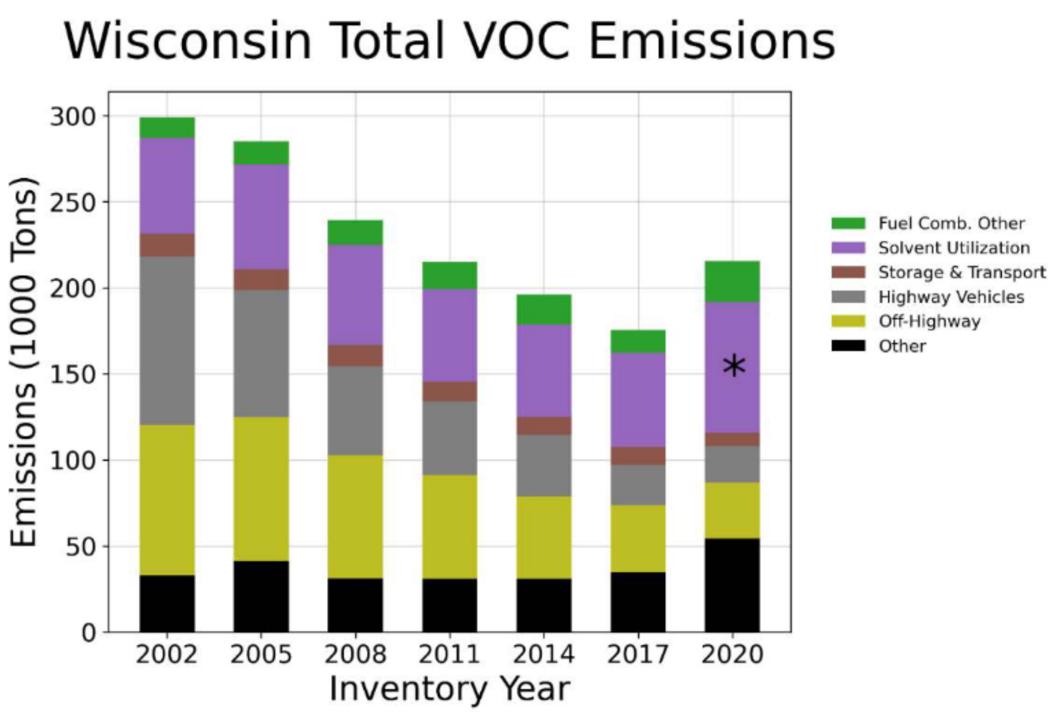
NOx consists of nitric oxide (NO) and nitrogen dioxide (NO_2). Most NOx is emitted as NO, which reacts fairly rapidly in the atmosphere to form NO_2, which has a longer lifetime in the atmosphere and can be transported longer distances. VOCs are a complex mixture of hundreds of different types of organic compounds, including compounds that contain only carbon and hydrogen ("hydrocarbons") and compounds that also include oxygen, nitrogen, sulfur and/or other elements. Some VOCs are emitted directly by anthropogenic sources, including benzene and toluene, whereas others are emitted directly by biogenic sources, such as isoprene. In addition to direct emissions, VOCs are formed in the atmosphere from reaction of other VOCs. These "secondary VOCs" include formaldehyde and acetaldehyde, which are important "carbonyl" compounds.[25]

Emissions of both NOx and VOCs from Wisconsin sources have decreased significantly in the last few decades (Figure 5.4). Total NOx emissions decreased 72% from 2002 through 2020, with the greatest reductions coming from highway vehicles and fuel combustion at electric utilities. VOC emissions decreased approximately 28% over this same period. Note that the apparent increase in VOC emissions in 2020 is due to significant changes in the EPA's inventory methodology. Specifically, EPA added agricultural silage emissions to the inventory for the first time, a source category that was unaccounted for in previous versions of the NEI. Had this category been included in the earlier inventories, the statewide decrease in VOCs since 2002 would be significantly greater.

[24] For examples, see the LADCO NOx/VOC Ozone Sensitivity contract reports. Task 1: https://widnr.widen.net/s/pprfxr5v5f/am_ladcotask1finalreport_20200930, Tasks 2 & 3: https://widnr.widen.net/s/xcfnfxmk8x/am_ladcotasks3and4finalreport_20201020
[25] Carbonyl compounds contain a carbon-oxygen double bond.

Figure 5.4. Wisconsin statewide annual NOx (top) and VOC (bottom) emissions by sector, 2002-2020. Data from the EPA's National Emissions Inventory (NEI).[26]





* This apparent increase in emissions is due to a methodology change, including addition of a new sector (see text).

[26] Data is from https://www.epa.gov/air-emissions-inventories/air-pollutant-emissions-trends-data.

5.4. Influence of Transport on Ozone Levels

The most important factor driving high ozone concentrations in Wisconsin's ozone nonattainment areas is the transport of ozone and ozone precursors from upwind areas. This section describes recent analyses of ozone transport and its impact on the Milwaukee 2015 ozone NAAQS nonattainment area. The transport of ozone and ozone precursors from areas outside Wisconsin significantly limits the state's ability to reduce high ozone concentrations within this nonattainment area.

5.4.1. LADCO modeling results

As described in Section 4, LADCO conducted photochemical modeling to support 2015 ozone NAAQS attainment planning for its member states. As part of this effort, LADCO used the CAMx Anthropogenic Precursor Culpability Assessment (APCA) tool to calculate emissions tracers for identifying upwind sources of ozone precursors at downwind monitoring sites. This allowed the model to quantify the impacts of inventory sectors and geographic source regions on ozone concentrations at specific monitor locations. These results are included in the files available on the LADCO 2015 ozone modeling website.[27]

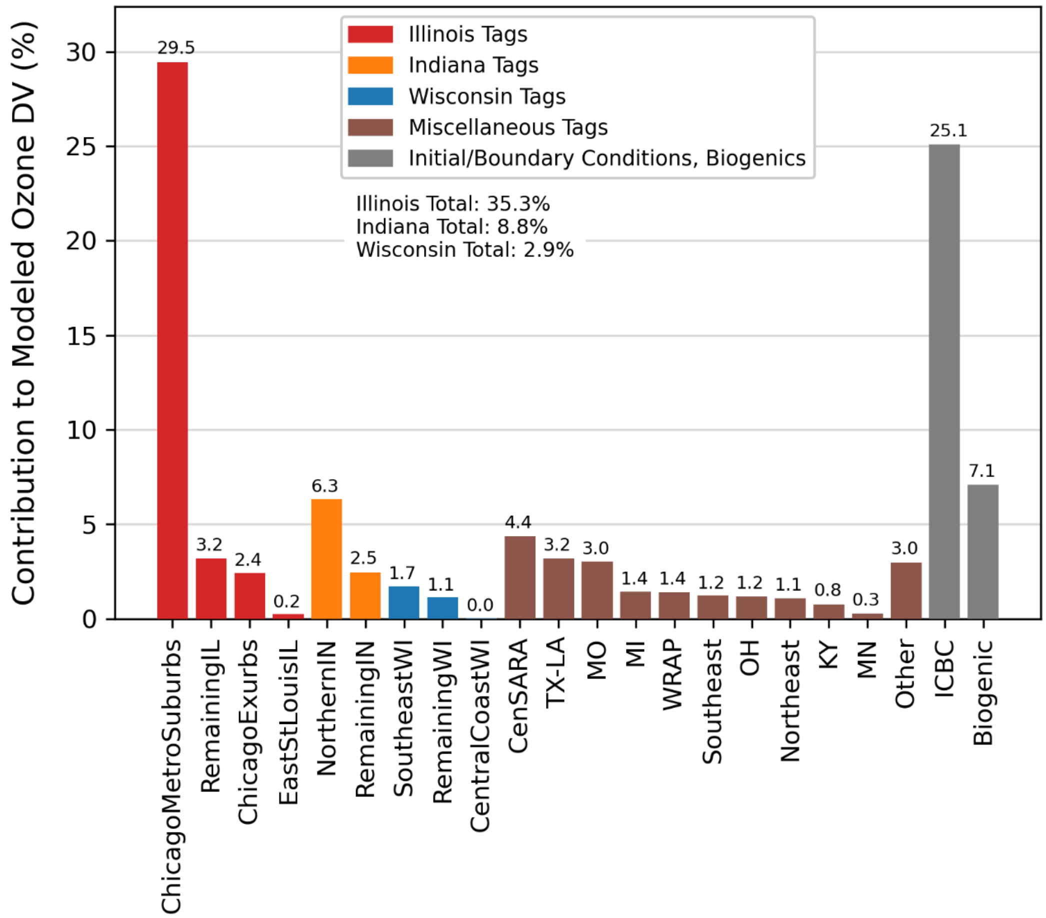
These source apportionment results allow one to identify the origins the ozone measured in the Milwaukee 2015 ozone NAAQS nonattainment area. As shown in Figure 5.5, Wisconsin sources contributed less than 3% of the ozone at the Racine-Payne and Dolan monitor, the monitor that historically measures the highest values in the Milwaukee 2015 ozone NAAQS nonattainment area.[28]

In contrast, six upwind states together contributed about 47% of the ozone. Of these states, Illinois and Indiana were the largest contributors, being responsible for 35% and 9%, respectively, of the ozone at this location. LADCO's modeling similarly showed that out-of-state contributions dominate measured ozone concentrations at the other ozone monitors in the nonattainment area. These results are further confirmed the EPA photochemical modeling results, discussed next.

[27] https://www.ladco.org/technical/ladco-internal/ladco-projects/ladco-2015-o3-naaqs-moderate-area-sip-technical-support-document/. Data for individual receptors are available from this file: https://www.ladco.org/wp-content/uploads/Projects/Ozone/ModerateTSD/LADCO_2016_APCA_Tracers_27July2022.xlsx.

[28] The Bayfield monitor registered the same design value as Racine in 2023; however, this is a historic outlier. For projection purposes, regulatory agencies (including the WDNR and the EPA) use Racine as the bellwether ozone monitor for the Milwaukee area.

Figure 5.5. LADCO source apportionment modeling results for the Racine-Payne and Dolan monitor.[29]



5.4.2. EPA modeling results

For its 2015 ozone NAAQS transport rule (the Good Neighbor Plan), the EPA also conducted photochemical modeling, which included state source apportionment results.[30] This modeling was used by the EPA to determine which upwind states are responsible for ozone measured in downwind state nonattainment and maintenance areas. Consistent with LADCO's modeling, the

[29] Total emissions from IL, IN and WI are obtained from summing the "sub-state" results in the figure. "SoutheastWI" is Kenosha, Racine, Milwaukee, Washington, Waukesha and Ozaukee counties. "CentralCoastWI" is Sheboygan, Manitowoc and Kewaunee counties. "RemainingWI" is the rest of WI. "CenSARA" is IA, KS, NE, OK, AR. "WRAP" is WA, OR, CA, NV, ID, MT, WY, UT, AZ, NM, CO, ND, SD. "Southeast" is FL, MS, AL, GA, SC, NC, TN, VA, WV. "Northeast" is CT, ME, MA, NH, NJ, NY, RI, VT, PA, MD, DE, DC. "ICBC" is initial/boundary conditions (including emissions from outside the U.S.). "Biogenic" is emissions from biogenic sources. Graphic by WDNR from LADCO modeling data.

[30] The EPA's air quality modeling technical support document and data files are available at: https://www.epa.gov/csapr/good-neighbor-plan-2015-ozone-naaqs. Data cited in this discussion is for analysis year 2023 from the 2016v3 modeling conducted by the EPA for the final Good Neighbor Plan. The EPA's 2016v2 modeling, used to support the draft Good Neighbor Plan, produced similar results.

EPA found that the ozone along Wisconsin's lakeshore is significantly influenced by upwind state emissions.

Specific to the Milwaukee area, the EPA found that Wisconsin sources are responsible for just 11% of the ozone at the Racine monitor, with other states responsible for 49% (with Illinois responsible for 20% and Indiana 14%).[31]

The difference in results between the EPA and LADCO modeling are due to the use of different emissions platforms, model configurations, analysis years, and other factors; as described in Section 4.1, LADCO's modeling is optimized for conditions in the Great Lakes region and the results are considered to be more accurate for monitors in this nonattainment area. However, both LADCO's and the EPA's modeling results are consistent in that they conclude that Wisconsin emissions contribute very little to the ozone measured in the Milwaukee 2015 ozone NAAQS nonattainment area, especially relative to other, upwind states. They both highlight that Wisconsin has very limited ability to reduce ozone values in this area further through unilateral action.

5.5. Conclusion

These analyses show that monitored ozone concentrations in the area have decreased since 2000. When adjusted to account for meteorological variability, ozone concentrations for equivalent meteorological conditions also show a decrease. Emissions of NOx and VOCs from Wisconsin have decreased from 2002 through 2020. A critical limitation to attainment planning is that the area remains highly impacted by transport of out-of-state ozone and ozone precursors; this limits the state's ability to independently drive ozone values lower and attain the NAAQS.

[31] Contributions data is for year 2023.

6. OTHER MODERATE AREA SIP REQUIREMENTS

6.1. Reasonably Available Control Technology (RACT) Program for NOx

Wisconsin's NOx RACT program was first adopted by the state in July 2007 as codified under subchapter IV of ch. NR 428 (s. NR 428.20 to 428.26), Wis. Adm. Code. The program was approved by the EPA into the SIP in October 2009 (75 FR 64155). This program was established to fulfill NOx RACT requirements for southeast Wisconsin counties (including the Milwaukee area) designated moderate nonattainment for the 1997 ozone NAAQS.

The WDNR has determined that Wisconsin's current NOx RACT program fulfills RACT requirements under the 2015 ozone NAAQS. The basis for this determination is:

1) In moderate ozone nonattainment areas, Wisconsin's NOx RACT program applies to major sources with a potential-to-emit of 100 tons per year and thus meets the necessary applicability requirements.

2) A review of control technology indicates that a new assessment of control technology conducted for the 2015 ozone NAAQS would not change the determination of RACT under Wisconsin's existing program.

Details supporting this finding are described below.

6.1.1. Major Source Applicability

To ensure consistency with the CAA, ch. NR 428, Wis. Adm. Code, was revised in March 2022 so that the level of an area's ozone nonattainment classification determines the major source emission threshold in the area. The EPA set applicability of RACT for facilities in Moderate ozone nonattainment areas at a NOx emissions threshold of 100 tons per year (TPY) or more based on a facility's PTE[32]. Under Wisconsin's revised NOx RACT rule, the applicability threshold for NOx emissions sources in the Milwaukee 2015 ozone nonattainment areas is 100 TPY (s. NR 428.20, Wis. Adm. Code).

6.1.2. Control Technology Assessment

The 2015 ozone implementation rule provides that states can show that existing NOx RACT programs fulfill requirements for the 2015 NAAQS.[33] The EPA states this demonstration should be based on a review of RACT control technologies for conditions in 2015. If this review indicates there would be no incremental difference in control technologies between the existing program and the updated assessment, the existing program can be certified as meeting RACT under the 2015 NAAQS. Even in the case that an updated RACT could result in additional emission reductions, the EPA indicates that such an action would likely not be cost-effective, stating:

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[32] EPA, 1988, *Issues Relating to VOC Regulation Cutpoints, Deficiencies, and Deviations, Clarification to Appendix D of November 24, 1987 Federal Register,* May 25, 1988.

[33] EPA, 2015, *Implementation of the 2008 National Ambient Air Quality Standards for Ozone: Requirements for State Implementation Plans*, 80 FR 12279, March 6, 2015.

> *"In cases where controls were applied due to the 1-hour or 1997 NAAQS ozone RACT requirement, we expect any incremental emissions reductions from the application of a second round of RACT controls may be small and, therefore, the cost for advancing that small additional increment of reduction may not be reasonable."*

The WDNR relied on this provision from the 2008 ozone implementation rule to show that Wisconsin's existing NOx RACT programs also fulfill requirements for the 2015 NAAQS.[34] This demonstration should then be based on a review of RACT control technologies for conditions in 2015. Wisconsin's NOx RACT program was first implemented in 2007 based on an assessment of the control technologies and cost information available at that time. The WDNR expects little, if any, change in the assessment of RACT control technology between 2007 and 2015, since the RACT assessments would be based on essentially the same information.

To verify this conclusion, the WDNR reviewed the current Wisconsin RACT requirements that could apply for emission units operating in the Milwaukee 2015 ozone NAAQS nonattainment area in 2015. The RACT source categories and applicable control technologies are presented in Table 6.1. The WDNR's review showed that six coal-fired boilers operating at the Elm Road and South Oak Creek power plants fall into the RACT source category of coal-fired boilers greater than 1,000 mmBtu/hr; four natural gas-fired boilers operating at the Valley power plant fall into the RACT source category of gas-fired boilers greater than 100 mmBtu/hr, and four natural gas-fired combustion turbines operating at the Port Washington power plant fall into the RACT source category of combined cycle combustion turbines greater than 25 megawatts. These power plant boilers and combustion turbines accounted for 64% of NO_x emissions in the Milwaukee nonattainment area in 2015.

After reviewing the identified source categories and applicable control technologies, the WDNR has concluded there would be no change in RACT if an updated assessment of control technology were performed based on 2015 information. Thus, based on equivalency in major source applicability and RACT control technology, the WDNR concludes that Wisconsin's current NOx RACT program under ss. NR 428.20 to 25 fulfills 2015 ozone NAAQS moderate-area RACT requirements.

[34] The 2015 ozone implementation rule references the 2008 ozone implementation rule for how air agencies can provide for RACT in their nonattainment SIPs (see 83 FR 63007).

Table 6.1. Control technologies required under Wisconsin's NOx RACT program.

Source Category	RACT Control Technology
Coal-fired boilers > 1,000 mmBtu/hr[1]	SCR
Coal-fired boilers < 250 mmBtu/hr[2]	SNCR
Natural gas-fired boilers > 100 mmBtu/hr	LNB/OFA/GR
Natural gas-fired combined cycle combustion turbines > 25 MW[3]	DLNB
Glass furnaces > 50 mmBtu/hr[4]	Oxy-firing
Metal furnaces > 75 mmBtu/hr	LNB

DLNB = Dry Low NOx Burner, GR = Gas Recirculation, LNB = Low NOx Burner, OFA = Overfire Air, SCR = Selective Catalytic Reduction, SNCR = Selective Non-Catalytic Reduction.
[1] Two of the six boilers retired in May 2024.
[2] These emission sources retired in 2016.
[3] These emission sources also have SCR control installed.
[4] These emission sources are also subject to an EPA consent decree with more stringent NOx emission limitation requirements than NOx RACT.

6.2. Reasonably Available Control Technology (RACT) Program for VOCs

Section 182(b)(2) of the CAA requires states with moderate nonattainment areas to implement VOC RACT under section 172(c)(1). Wisconsin's VOC RACT requirements are codified under chapters NR 419 through 425, Wis. Adm. Code. A summary of Wisconsin's VOC rules is included in Appendix 8. No additional measures are reasonably available that will advance the attainment date.

The EPA periodically issues Control Techniques Guidelines (CTGs) to establish VOC RACT requirements for specific source categories, and WDNR has incorporated most of those CTGs into Wisconsin's VOC rules. Five CTGs have not been incorporated. Appendix 8 contains negative declarations for these five CTGs to certify that Wisconsin has determined that there are no identified sources in the Milwaukee 2015 ozone NAAQS nonattainment area that meet the applicability criteria of these CTGs.

Given these negative declarations, Wisconsin's VOC RACT rules found in chapters NR 419 through 425, Wis. Adm. Code, satisfy Wisconsin's obligations under section 182(b)(2) of the CAA for the Milwaukee 2015 ozone NAAQS nonattainment area.

6.3. Evaluation of Reasonably Available Control Measures (RACM)

CAA section 172(c)(1) requires that states implement any reasonably available control measures necessary for attainment of the NAAQS. As described in 40 CFR 51.1108(d), any control measures needed for attainment must be implemented by the beginning of the attainment year ozone season, which in this case is 2023 (to support the August 3, 2024, moderate attainment date).

However, additional control measures are required if it can advance the attainment date by a year or more. This means that any measures advancing the attainment date by a year would have needed to be in place for the 2022 ozone season (for Milwaukee, that season is April 1 to

October 15, 2022). Given the timing of this submittal, it is not possible to implement any new measures during that period that could advance attainment by one year. Accordingly, RACM requirements are satisfied for the Milwaukee 2015 ozone NAAQS nonattainment area.

6.4. Transportation Conformity

Transportation conformity is required by section 176(c) of the CAA (42 U.S.C. 7506(c)). Conformity to a SIP means that transportation activities will not produce new air quality violations, worsen existing violations, or delay timely attainment of the NAAQS (CAA 176(c)(1)(B)).

The EPA's conformity rule in 40 CFR part 93 requires that transportation plans, programs and projects conform to SIPs and establish the criteria and procedures for determining whether they conform. The conformity rule generally requires a demonstration that emissions from the Regional Transportation Plan (RTP) and the Transportation Improvement Program (TIP) are consistent with the motor vehicle emissions budget (MVEB) contained in the control strategy SIP revision or maintenance plan (40 CFR 93.101, 93.118. and 93.124). A MVEB is defined as "that portion of the total allowable emissions defined in the submitted or approved control strategy implementation plan revision or maintenance plan for a certain date for the purpose of meeting reasonable further progress milestones or demonstrating attainment or maintenance of the NAAQS, for any criteria pollutant or its precursors, allocated to highway and transit vehicle use and emissions" (40 CFR 93.101). The WDNR is submitting MVEBs for the Milwaukee 2015 ozone NAAQS nonattainment area in this attainment plan.

6.4.1. Motor Vehicle Emissions Modeling

The MVEBs were developed using the latest version of the EPA's MOtor Vehicle Emission Simulator (MOVES) model, MOVES4.0.1, and a travel demand model. The MOVES4.0.1 model derives estimates of hot summer day emissions for ozone precursors of NOx and VOCs. Numerous variables can affect these emissions, especially the size of the vehicle fleet (the number of vehicles on the road), the fleet's age, the distribution of vehicle types, and the vehicle miles of travel. The transportation information is derived from the travel demand model. Appendix 7 contains key data used to develop inputs to MOVES4.0.1.[35]

6.4.2. Motor Vehicle Emissions Budgets

Table 6.2 shows the MVEBs developed by the WDNR for the Milwaukee 2015 ozone NAAQS nonattainment area for the years 2023 and 2024. These budgets are identical to the corresponding projected emissions inventories presented in section 3. They include a margin of safety to account for uncertainties in future mobile source emissions. 40 CFR 93.101 defines this safety margin as the amount by which the total projected emissions from all sources of a given pollutant are less than the total emissions that would satisfy the applicable requirement for RFP, attainment, or maintenance. To provide a safety margin, the WDNR increased the emissions

[35] The complete set of inputs to MOVES4.0.1 is too lengthy to include in this document. However, electronic copies of the inputs can be obtained from the WDNR upon request.

calculated by MOVES4.0.1 by 7.5% for 2023 and 2024 for the Milwaukee 2015 ozone NAAQS area.

Table 6.2. Motor vehicle emissions budgets for the Milwaukee 2015 ozone NAAQS area for 2023 and 2024.

Year	Emissions (tons per hot summer day)	
	VOC	NO_x
2023	10.77	14.80
2024	10.82	13.74

6.5. Motor Vehicle Inspection and Maintenance (I/M) Program

The purpose of motor vehicle I/M programs is to reduce emissions from in-use motor vehicles in need of repairs and thereby contribute to state and local efforts to improve air quality and attain the NAAQS. Wisconsin's I/M program has been in operation since 1984. It was originally implemented in accordance with the 1977 CAA Amendments and operated in the six counties of Kenosha, Milwaukee, Ozaukee, Racine, Washington, and Waukesha. Sheboygan County was added to the program in July 1993, resulting in a seven-county program area that has remained to the present. Vehicles were originally tested by measuring tailpipe emissions using a steady-state idle test. Tampering inspections were added in 1989.

The 1990 CAA Amendments set additional requirements for I/M programs. For moderate areas, a "basic" program was required under section 182(b)(4). For serious or worse areas, an "enhanced" program was required under section 182(c)(3). The EPA's requirements for basic and enhanced I/M programs are found in 40 CFR part 51, subpart S.

Wisconsin's I/M program transitioned to an enhanced program in December 1995. The major enhancement involved adding new test procedures to more effectively identify high-emitting vehicles. These new test procedures included a transient emissions test in which tailpipe emissions were measured while the vehicle was driven on a dynamometer (a treadmill-type device). Improving repairs and public convenience were also major focuses of the enhancement effort.

Since July 2001, all model year (MY) 1996 and later cars and light trucks have been inspected by scanning the vehicle's computerized second-generation on-board diagnostic (OBDII) system instead of measuring tailpipe emissions. As of July 2008, the program dropped tailpipe testing entirely and has inspected all vehicles by scanning the OBDII system. This change was the result of statutory changes in the State's 2007-2009 biennial budget which exempted model years of vehicles not federally required to be equipped with the OBDII technology (MY 1995 and earlier cars and light trucks and MY 2006 and earlier heavy trucks). To help offset the emissions reductions lost from exempting the pre-OBDII vehicles, the program increased the testable fleet for MYs 2007 and later by adding gasoline-powered vehicles between 10,001 to 14,000 pounds gross vehicle weight rating (GVWR) and diesel-powered vehicles of all weights up to 14,000 pounds GVWR.

The EPA fully approved Wisconsin's enhanced I/M program on August 16, 2001 (66 FR 42949), including the program's legal authority and administrative requirements in the Wisconsin Statutes and Wisconsin Administrative Code. On June 7, 2012, the WDNR submitted a SIP revision to the EPA covering all the changes to the program since the EPA approved the program in 2001. This submittal included a demonstration under section 110(l) of the CAA addressing emission reductions associated with the program changes. The EPA approved this SIP revision on September 19, 2013 (78 FR 57501).

A modeled demonstration confirming that Wisconsin’s current I/M program continues to meet the enhanced I/M program performance standard was completed in 2021 as part of the state’s redesignation request for the Kenosha County (partial) 2008 ozone nonattainment area. The EPA approved this demonstration on April 11, 2022 (87 FR 21027).

Wisconsin’s I/M program is jointly administered by the WDNR and the Wisconsin Department of Transportation. Legal authority and administrative requirements for the Wisconsin I/M program are found in sections 110.20 and 285.30 of the Wisconsin Statutes and Chapters NR 485 and Trans 131 of the Wisconsin Administrative Code.

6.6. Section 110(l) Noninterference Requirements

When revising rules and regulations in the SIP, the state is responsible for demonstrating that such a change will not interfere with any applicable requirement concerning attainment and reasonable further progress, or any other applicable CAA requirements for any of the criteria pollutants. This attainment plan does not remove or relax any control programs or requirements currently approved in the SIP. Therefore, all requirements related to section 110(l) noninterference are fulfilled. The WDNR has the legal authority and necessary resources to actively enforce any violations of its rules or permit provisions. Removal of any control program from the SIP will be subject to a public hearing process, a demonstration of noninterference, and approval by the EPA.

6.7. Section 172(c)(9) Contingency Measures

Contingency measures required by CAA section 172(c)(9) are fully adopted rules or measures that can take effect without further action by the state or the EPA upon failure to meet milestones (like RFP) or attain by the attainment deadline. The purpose of contingency measures is to provide continued emissions reductions while the SIP is being revised to meet the missed milestone or attainment date. Reductions are to be achieved as soon as possible but should generally occur within one year of the triggering event. Contingency measures must be in excess of what is needed to meet any other nonattainment plan requirement in the CAA, such as RACT/RACM, RFP, and attainment modeling.[36]

[36] The EPA described how states are to address contingency measure requirements for the 2015 ozone NAAQS in its final SIP requirements rule for the NAAQS (83 FR 62998). In response to several court decisions on this topic, on March 17, 2023 the EPA released new draft guidance on this requirement, which would alter how contingency measures could be addressed by states (see 88 FR 17571). This guidance remains draft as of the date of this submittal.

Since the attainment year for this area is 2023, the WDNR has evaluated contingency measure reductions that would occur by 2024. The 2015 ozone NAAQS SIP requirements rule states that contingency measures should provide one year's worth of emissions reductions, which generally equates to 3% of the baseline emissions inventory.

As described in Section 3.3, the WDNR has identified and quantified permanent and enforceable NOx and VOC emissions reductions in the nonattainment area equivalent to an additional 3% reduction in emissions in 2024. These reductions are based on an extensive range of point, area, and mobile source rules that are permanent, enforceable, and in excess of those otherwise needed to meet attainment planning requirements in 2023 (Section 3.6). These rules are fully adopted and need no further action by the state or the EPA in order to take effect. The CAA contingency measure requirements for this area for therefore satisfied.

7. PUBLIC PARTICIPATION

To comply with section 110(a)(2) of the CAA, on December 16, 2024, the WDNR published a notice of availability for this proposed SIP revision on its website, making this document available for public comment through January 17, 2025. This notice also provided notification that the WDNR would hold a public hearing on this proposed SIP revision on January 16, 2025. The WDNR will respond to any public comments received on this draft in the final SIP it submits to the EPA.

8. CONCLUSION

This plan is submitted to fulfill the CAA moderate-area attainment requirements for the Milwaukee 2015 ozone NAAQS nonattainment area. Analyses of air quality data confirm that ozone concentrations and ozone precursor emissions have decreased in both the nonattainment area and the state and are projected to continue to decrease in the future. The area has met the required RFP emission reductions due to an array of permanent and enforceable emissions control measures, and has satisfied all other moderate area nonattainment area requirements required under sections 172 and 182 of the CAA.