

APPENDIX 4

2020 and 2030 Wisconsin Emissions Projections Documentation

This appendix includes:

4.1	EGU Inventory Methodology for 2020 and 2030.....	2
4.2	Point Non-EGU Inventory Methodology for 2020 and 2030.....	3
4.3	Area Source Inventory Methodology for 2020 and 2030.....	7
4.4	Onroad Inventory Methodology for 2020 and 2030.....	9
4.5	Nonroad Inventory Methodology for 2020 and 2030.....	10

Appendix 4.1 – EGU Inventory Methodology for 2020 and 2030

See Appendix 5 for the projection methodology related to EGUs.

Appendix 4.2 – Point Non-EGU Inventory Methodology for 2020 and 2030

4.2.1 – Growth Factors from AEO 2014/2015 for Existing Sources

Non-EGU point source projected 2020 and 2030 emissions were derived by first applying growth factors to the 2011 base year inventory. These growth factors were developed from Annual Energy Outlook (AEO) 2014 and AEO 2015 industry-specific energy consumption data, summarized in Table 4.2.1. Growth in energy consumption was assumed to correspond linearly with growth in emissions. Growth factors from 2011 were used instead of 2014 because historic energy consumption values were only available up to the year 2012 in AEO. A second step in projecting emissions – accounting for potential emissions increases resulting from the modification of existing sources or the installation of new sources – is described in section 4.2.2 below.

Table 4.2.1. Growth Factors from AEO 2014/2015 Used for Projecting Wisconsin Non-EGU Point Source Emissions in Eastern Kenosha County.

NAICS	NAICS Description	AEO 2014/2015 Industrial or Commercial Sub-sector ¹	AEO 2014/2015 Energy Consumption (trillion Btu) ^{1,2}			Growth Factor (from 2011) ³	
			2011	2020	2030	2020 GF	2030 GF
331513	Foundries - Steel	Iron and Steel Industry	1,362	1,507	1,492	1.11	1.10
311421	Food Manufacturing	Food Industry	1,114	1,238	1,294	1.11	1.16
322222	Paper Bag and Coated and Treated Paper Manufacturing	Paper Industry	2,018	2,136	2,216	1.06	1.10
611310	Colleges, Universities, and Professional Schools	Commercial sector energy consumption (natural gas) for East North Central U.S.	0.72	0.70	0.69	0.97	0.97
6221	General Medical and Surgical Hospitals	Commercial sector energy consumption (natural gas and distillate fuel oil) for East North Central U.S.	0.75	0.73	0.73	0.97	0.97
325510	Paint, Coating and Adhesive Manufacturing	Bulk Chemical Industry	2,441	2,619	2,741	1.07	1.12
622110	General Medical and Surgical Hospitals	Commercial sector energy consumption (natural gas and distillate fuel oil) for East North Central U.S.	0.75	0.73	0.73	0.97	0.97
611310	Colleges, Universities, and Professional Schools	Commercial sector energy consumption (natural gas and distillate fuel oil) for East North Central U.S.	0.75	0.73	0.73	0.97	0.97

NAICS	NAICS Description	AEO 2014/2015 Industrial or Commercial Sub-sector ¹	AEO 2014/2015 Energy Consumption (trillion Btu) ^{1,2}			Growth Factor (from 2011) ³	
			2011	2020	2030	2020 GF	2030 GF
331523	Foundries - Aluminum	Aluminum Industry	351	411	419	1.17	1.19
335921	Electrical Equipment, Appliance, and Component Manufacturing	Metal Based Durables Industry - Electrical Equipment	69	77	79	1.13	1.15
323111	Printing and Related Support Activities	Paper Industry	2,018	2,136	2,216	1.06	1.10
31121	Flour Milling and Malt Manufacturing	Food Industry	1,114	1,238	1,294	1.11	1.16
332322	Fabricated Metal Product Manufacturing	Metal Based Durables Industry - Fabricated Metal Products	331	384	390	1.16	1.18

¹ Source: <http://www.eia.gov/forecasts/aeo/index.cfm>

² 2011 energy consumption values are from AEO 2014; 2020 and 2030 projected energy consumption values are from AEO 2015.

³ Growth factors for the entire 2011-2020 and 2011-2030 periods were calculated by dividing the 2020 or 2030 energy consumption values by the 2011 energy consumption value.

4.2.2 – Modified and New Source Emissions

Section 172(c)(4) of the Clean Air Act (CAA) requires identification and quantification of potential emissions from new or modified sources when developing emission inventories for attainment and maintenance purposes. The point source emissions inventory described in section 4.2.1 above includes projections of emissions growth determined by applying general regional growth factors. However, this methodology alone does not distinguish emissions associated with modified and new sources. Therefore, as a second step the WDNR reviewed permitting actions for sources in eastern Kenosha County from 2005 through 2015 (ten years). A summary of the permitting activity and associated potential emissions is shown in Table 4.2.2. The resulting emissions from this exercise are added to the projected emissions for *existing* point source non-EGU, to yield the *total* projected point source non-EGU emissions for 2020 and 2030 found in section 4.3 of the eastern Kenosha County ozone nonattainment area redesignation request (see also Appendix 6, Table 6.2 for the addition of new/modified sources to existing sources). This approach may add emissions which overlap with existing source grown emissions; but, it provides a more conservative high estimate of future emissions. It should be noted that this future projection of emissions does not limit the amount of future emissions allowed from modified and new sources. This is consistent with the CAA which allows for the installation of new or modification of sources subject to requirements of the New Source Review (NSR) or Prevention of Significant Deterioration (PSD) programs as discussed in section 6 of the eastern Kenosha County ozone nonattainment area redesignation request.

The review summarized in Table 4.2.2 shows a number of minor permitting actions taken at existing facilities. These actions have a potential to increase total emissions by 0.132 and 0.029 tons per day for NOx and VOC, respectively. This review shows that the permitting activity focused on modification or addition of processes at existing facilities.

The review did identify the construction of one new facility with process lines for mixing commercial paint products. The potential VOC emissions (based on enforceable operating constraints) for this new facility were below 100 tons per year and therefore constituted a minor source permitting action. Based on the focus of permitting actions to existing facilities, the WDNR believes that construction of a new facility does not occur regularly and that it is more likely that existing facilities would be expanded for additional production. In addition, a new facility is unlikely to operate at full capacity, at least through the initial maintenance period. Therefore, the WDNR believes that applying 50 tons per year is a better approximation of actual emissions for purposes of counting emissions from this new facility in projecting future emissions. This value is reflected in the calculation of tons per day emissions for the new facility and in the total summed value for VOC.

Based on this information, emission estimates of 0.132 and 0.166 tons per day of NOx and VOC, respectively, are added to the projection of future year point source emissions.

Table 4.2.2. Permitting Actions for Existing Source and New Emission Sources – 2005 to 2015.

Construction Permit Class	Year	Potential Emissions Increase (TPY)		Estimated Daily Average (TPD) ¹		Project Description
		NOx	VOC	NOx	VOC	
<i>Existing Facilities and Units:</i>						
Minor action ²	2005	8.00	0.28	0.022	0.001	Permit change to allow burning propane as backup fuel in a small boiler.
Minor action ²	2005	0.00	6.75	-	0.018	Replacement of an existing aerosol can fill line.
Minor action ²	2006	0.00	0.28	-	0.001	Operation of temporary process for facility maintenance.
Minor action ²	2008	40.00	3.19	0.110	0.009	Installation of a new diesel engine pump.
Subtotal =	-	48.00	10.50	0.132	0.029	-

Construction Permit Class	Year	Potential Emissions Increase (TPY)		Estimated Daily Average (TPD) ¹		Project Description
		NOx	VOC	NOx	VOC	
<i>New Facilities:</i>						
Minor action	2010	0.00	50.00	-	0.137	Construction of a new paint product mixing facility.
<i>Existing and New Facilities:</i>						
Total	-	48.0	60.5	0.132	0.166	-

¹ The tons per day (TPD) daily emissions are calculated by dividing annual potential emissions by 365 days. These are also assumed to be equivalent to tons per summer day (tpsd) emissions.

² A minor action is a permitting action that falls below the major source threshold of 100 tons per year (TPY) or significant emissions increase threshold of 40 TPY.

Appendix 4.3 – Area Source Inventory Methodology for 2020 and 2030

The 2020 and 2030 area source emission inventories were projected based on 2011 area source emissions inventory for eastern Kenosha County. These emission projections were primarily determined by applying growth and control factors developed by Alpine Geophysics to the 2011 base year inventory. If growth factors (GFs) were not available for a certain source classification code (SCC), county-level population-based growth factors were derived based on the Wisconsin Department of Administration’s Demographic Services Center population reports. Growth in population was assumed to correspond linearly with growth in emissions. Tables 4.3.1 and 4.3.2 provide summaries of the Alpine-based growth factors and population-based growth factors, respectively.

Table 4.3.1. Growth Factors from Alpine Geophysics Used for Projecting Wisconsin Area Source Emissions in Eastern Kenosha County.

SCC	SCC Description	Growth Factor (from 2011 base year) Provided by Alpine ¹			
		2018 GF	2023 GF	2030 GF	2020 GF est. ²
2104008100	Fuel Comb - Residential - Wood Fireplace: General	1.061	1.081	1.138	1.069
2104008210	Fuel Comb - Residential - Woodstove: fireplace inserts; non-EPA certified	0.989	0.959	0.942	0.977
2104008220	Fuel Comb - Residential - Woodstove: fireplace inserts; EPA certified; non-catalytic	1.136	1.216	1.373	1.168
2104008230	Fuel Comb - Residential - Woodstove: fireplace inserts; EPA certified; catalytic	1.136	1.216	1.373	1.168
2104008310	Fuel Comb - Residential - Woodstove: freestanding, non-EPA certified	0.989	0.959	0.942	0.977
2104008320	Fuel Comb - Residential - Woodstove: freestanding, EPA certified, non-catalytic	1.136	1.216	1.373	1.168
2104008330	Fuel Comb - Residential - Woodstove: freestanding, EPA certified, catalytic	1.136	1.216	1.373	1.168
2104008400	Fuel Comb - Residential - Woodstove: pellet-fired, general (freestanding or FP insert)	1.136	1.216	1.373	1.168
2104008510	Fuel Comb - Residential - Wood Furnace: Indoor, cordwood-fired, non-EPA certified	1.136	1.216	1.373	1.168
2104008610	Fuel Comb - Residential - Wood Hydronic heater: outdoor	1.136	1.216	1.373	1.168
2104008700	Fuel Comb - Residential - Outdoor wood burning device, NEC (fire-pits, chimeas, etc.)	1.061	1.081	1.138	1.069
2104009000	Fuel Comb - Residential - Firelog	1.061	1.081	1.138	1.069
2461850000	Solvent - Consumer & Commercial Solvent Use: Pesticide Application: Agricultural	0.981	0.985	0.985	0.9826
2415000000	Solvent - Degreasing	1.215	1.215	1.278	1.215

¹ Source: Alpine Geophysics, June 2014. Project Technical Memorandum: Future Year Growth and Control Factors. Technical Report for Lake Michigan Air Directors Consortium.

² The 2020 GF was interpolated from the 2018 and 2023 GF's.

Table 4.3.2. Population Estimates and Growth Factors Used for Projecting Wisconsin Area Source Emissions in Eastern Kenosha County.

Population Estimates for Kenosha County ¹			Population Estimated Growth Factors (from 2011) ²	
PopAll2011 (est)	PopAll2020	PopAll2030	2020	2030
166,632	181,975	200,620	1.092	1.204

¹ Source: <http://doa.wi.gov/Divisions/Intergovernmental-Relations/Demographic-Services-Center>.

² Growth factors for the entire 2011-2020 and 2011-2030 periods were calculated by dividing the 2020 or 2030 population estimates by the 2011 population estimate.

Appendix 4.4 – Onroad Inventory Methodology for 2020 and 2030

The 2020 and 2030 projected onroad emissions were developed using the MOVES2014a model, as was the case for the 2011 and 2014 emissions.

Vehicle age distributions were projected from a base 2014 distribution using the Age Distribution Projection Tool developed by the EPA (see: <https://www3.epa.gov/otaq/models/moves/tools.htm>). This macro-based excel file projects a base year age distribution by source type to a future distribution using a similar algorithm to what EPA used to generate the national projected age distributions in MOVES2014.

The Southeastern Wisconsin Regional Planning Commission (SEWRPC) provided projected transportation data assuming their high economic growth scenario. The annual VMT growth rate for the eastern Kenosha County nonattainment area under this scenario is about 2.27% from 2014 to 2020 and about 0.95% from 2020 to 2030. Table 4.4.1 shows the annual VMT values provided by SEWRPC and the summer weekday VMT values outputted by MOVES2014a. The factors to convert annual VMT to summer weekday VMT were those previously agreed to and used by WDNR and SEWRPC.

Table 4.4.1. Vehicle-Miles of Travel for the Eastern Kenosha County Nonattainment Area

Year	Vehicle-Miles of Travel	
	Annual	Summer Weekday
2011	907,935,808	2,878,875
2014	979,368,544	3,105,378
2020	1,120,677,953	3,553,459
2030	1,231,360,240	3,904,398

The speed distributions provided by SEWRPC reflected the 5 mph speed limit increase (65 mph to 70 mph) which took effect in 2015 on certain restricted access roadways throughout Wisconsin, including Interstate Highway 94 in Kenosha County. MOVES2014a predicts an increase in NOx and VOC emissions from this increase in speed.

Emissions were increased by a 7.5% safety margin, as agreed through the transportation conformity consultative process.

The motor vehicle I/M program and reformulated gasoline were both assumed to remain in effect for 2020 and 2030.

Detailed listing of the projected onroad emissions and activity data are provided in Appendix 9.

Appendix 4.5 – Nonroad Inventory Methodology for 2020 and 2030

The methodology for the 2020 and 2030 projected nonroad emissions is parallel to the methodology used for the 2011 and 2014 estimates. For all source categories except commercial marine, aircraft and rail locomotive (MAR), the MOVES2014a model was run for Kenosha County at hot summer day temperatures, assuming the model's default growth projections. Countywide emissions were then allocated to the eastern Kenosha County nonattainment area using the same allocation factors used for 2011 and 2014.

For the MAR categories, the 2020 emissions were linearly interpolated between the 2017 and 2025 emissions provided in the EPA's Version 6.2 Modeling Platform. The 2030 emissions were assumed to be equal to the 2025 Modeling Platform emissions if those 2025 emissions were less than the 2017 Modeling Platform emissions. If the 2025 Modeling Platform emissions exceeded the 2017 Modeling Platform emissions, the 2030 emissions were linearly extrapolated from the 2017 and 2025 Modeling Platform emissions.

Detailed listings of the projected nonroad emissions for over 200 subcategories are provided in Appendix 8.