



Mercury Emissions Inventory Update

2020 Statewide Mercury TMDL Oversight Committee Meeting

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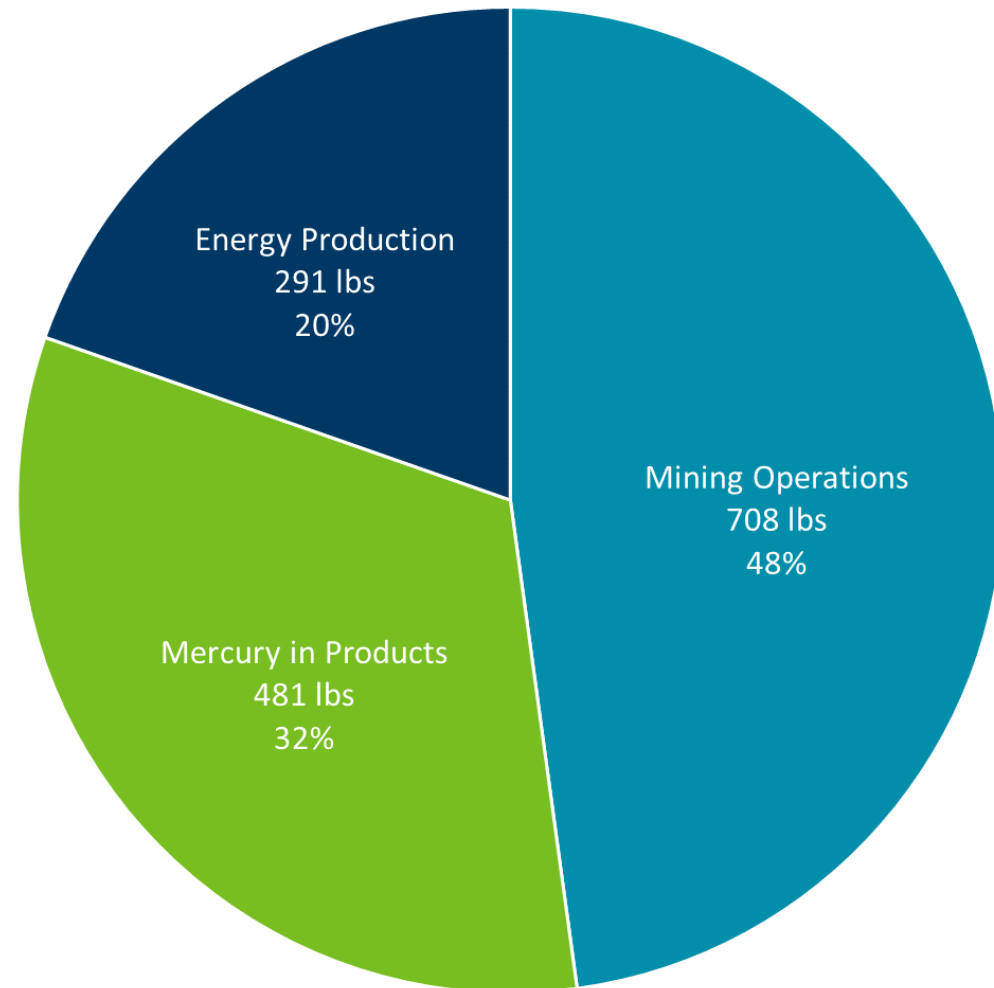
Overview

- Mercury emission inventories (2018-2019)
- 2025 mercury emission projections
- Review of 2018 emission reduction targets
- In-depth mercury emissions inventory review
- Regional & national mercury emissions
- Moving forward
- Questions and answers

Minnesota's 2018 mercury emissions

- The 2018 Hg Inventory includes:
 - 2018 point source emissions
 - 2017 non-point source emissions
- Notable takeaways:
 - Mercury from energy production continues to decline (petroleum product usage & coal-fired electricity)
 - Mercury in products relatively flat (increased MSW-related mercury & significant reductions due to mercury controls at Gerdau Ameristeel)
 - Mercury from mining operations relatively flat (small increase due to production increases)

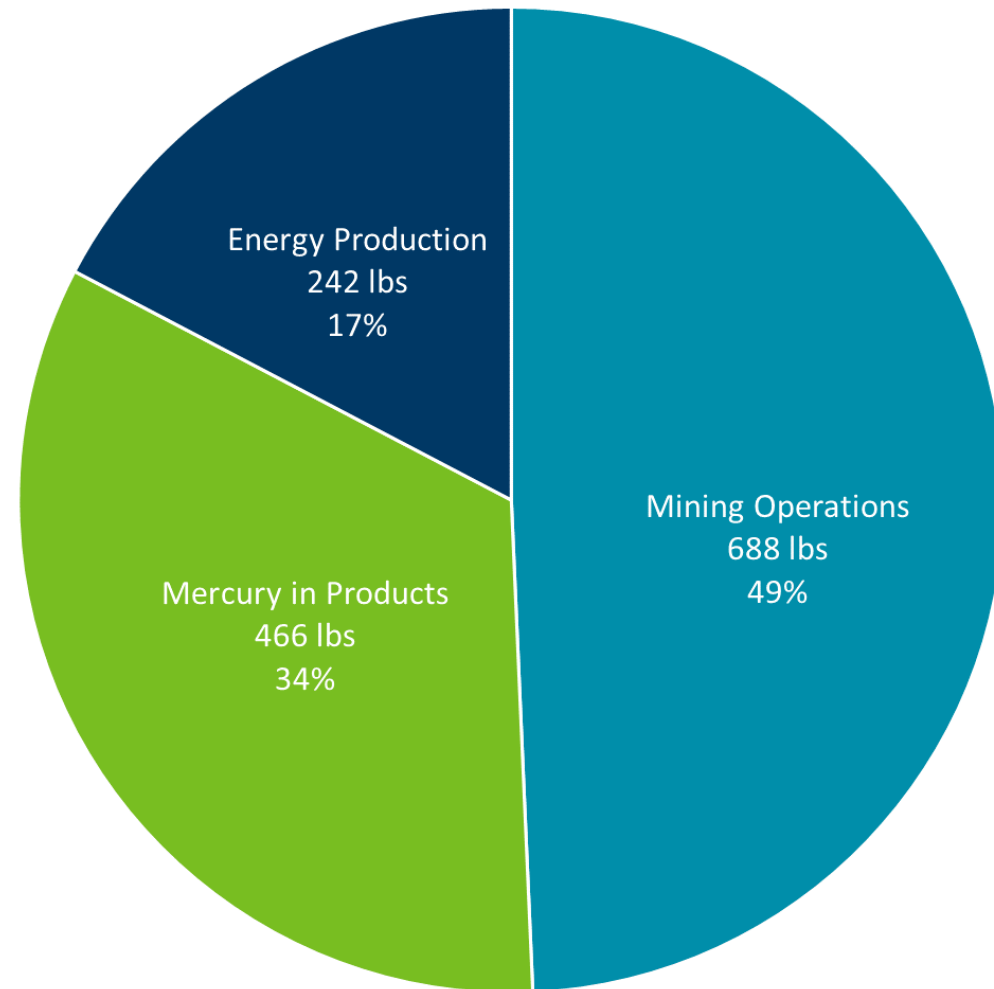
2018 Mercury Emissions by Major Category

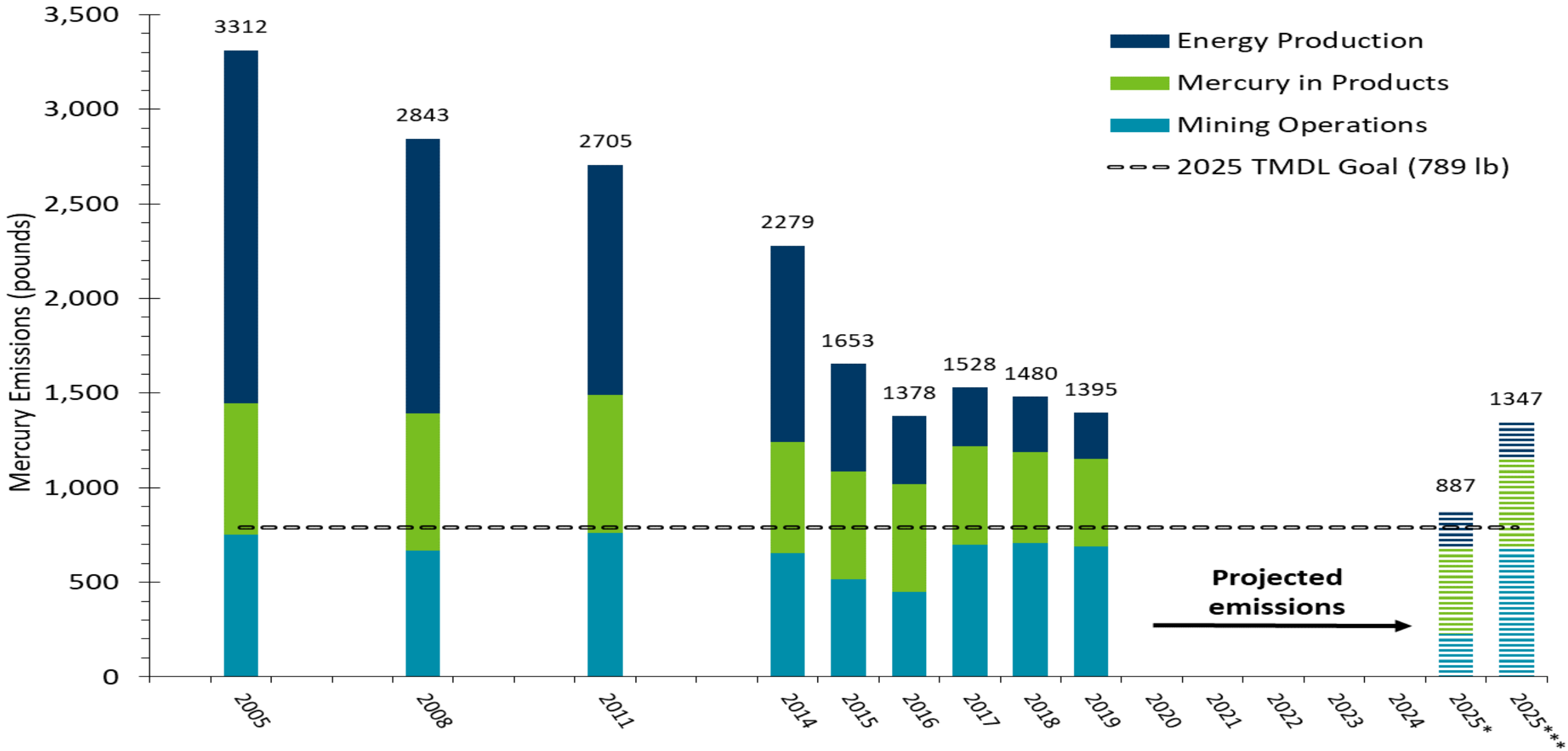


Minnesota's 2019 mercury emissions

- The 2019 Hg Inventory includes:
 - 2019 point source emissions
 - 2017 non-point source emissions
- Notable takeaways:
 - Mercury from energy production declines further (primarily reductions from coal-fired electricity)
 - Mercury in products relatively flat (further reductions at steel melters and solid waste incinerators)
 - Mercury from mining operations relatively flat (small decrease due to production decreases)

2019 Mercury Emissions by Major Category



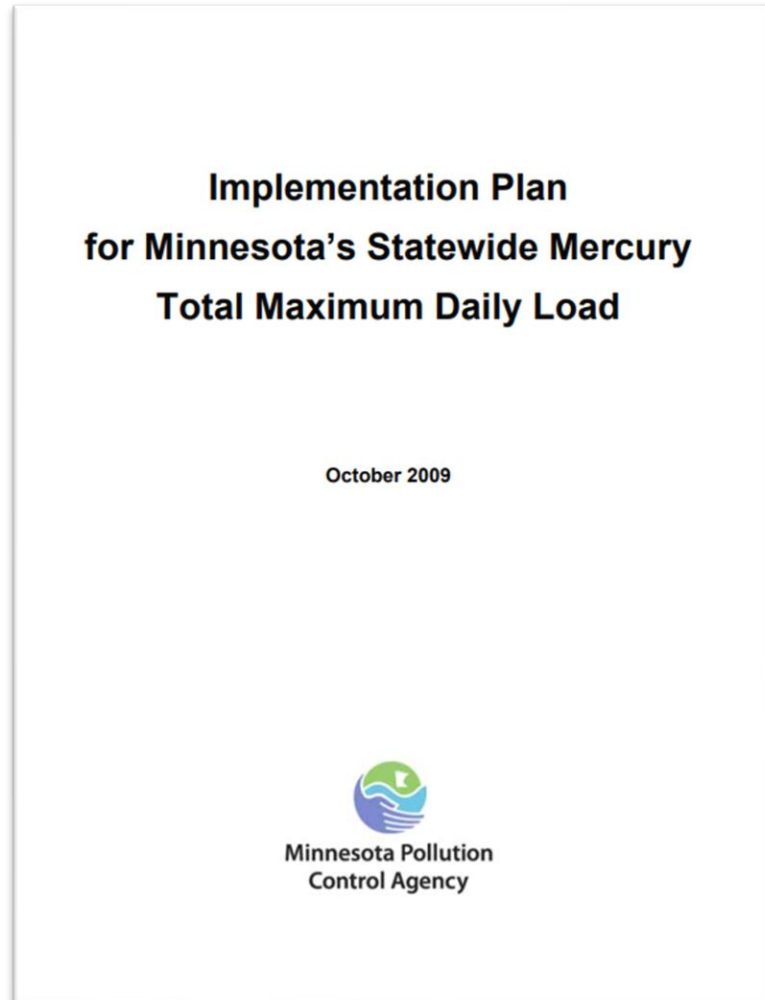


* This projection is based on the ferrous mining/processing industry in northern MN meeting the required 72% reduction specified in Minn. R. 7007.0502.

*** This projection is based on the ferrous mining/processing industry's proposed reductions in each mercury reduction plan applied to the baseline emissions as calculated by MPCA.

Minnesota mercury emissions

2018 mercury reduction goals



- Statewide Mercury TMDL Implementation Plan
 - Identified mercury air emission target goals for 2018 and 2025
 - Provided a high-level overview of anticipated reduction strategy for source categories
 - Final target is a pound per year value, not a percent reduction

Minnesota mercury emissions

2018 mercury reduction goals

Emission Source Categories	Reduction Strategy Summary	Actual Mercury Emissions (lb)		2018 Actual Reduction		2018 Target Reduction	
		2005	2018	(lb/yr)	(%)	(lb/yr)	(%)
Source Categories with MPCA Air Permits							
Coal-fired Electric Generation	70-90% reduction by 2025 (units > 5 lb/yr)	1,716	167	1,550	90%	1,422	83%
ICI Boilers	70% reduction (units > 2 lb/yr)	70	39	31	44%	38	54%
Wood Combustion (Industrial Boilers)	70% reduction (units > 2 lb/yr)	31	25	6	18%	17	55%
Petroleum Refining	50% reduction by 2018, improved mass balance	13	3	10	74%	6	46%
Petroleum Product Utilization	50% reduction by 2018, improved understanding of fate	27	48	-21	-78%	12	44%
Smelters & Shredders	Reduce emissions to 10 lb by 2025	139	18	121	87%	119	86%
Ferrous Mining/Processing	75% reduction by 2025, research & reporting	735	696	39	5%	-106	-14%
Sewage Sludge Incineration	90% reduction at a single uncontrolled facility	9	9	-0.5	-6%	3	33%

Minnesota mercury emissions

2018 mercury reduction goals

Emission Source Categories	Reduction Strategy Summary	Actual Mercury Emissions (lb)		2018 Actual Reduction		2018 Target Reduction	
		2005	2018	(lb/yr)	(%)	(lb/yr)	(%)
Source Categories without MPCA Air Permits							
Recycling Mercury from Products	Reduce emissions to 8 lb by 2018, conduct mass balance	65	1	64	98%	57	88%
Mercury Product Manufacturing	Reduce emissions to 0.3 lb by 2025, quantify current emissions	42	0	42	100%	29	69%
Cremation	Reduce emissions to 32 lb by 2025, improve estimates	80	110	-30	-38%	17	21%
Dental Preparations	Reduce emissions to 5 lb by 2025, improve estimates	62	16	47	75%	52	84%
Product-Related Source Categories							
Sale, Use, Disposal of Mercury-containing Products	Various strategies to improve end-of-life management and decrease use	235	289	-53	-23%	147	63%
Emissions from Other Sources	Sources not addressed by reduction strategies	89	60	29	33%	21	24%
Total		3,312	1,480	1,832	55%	1,834	55%

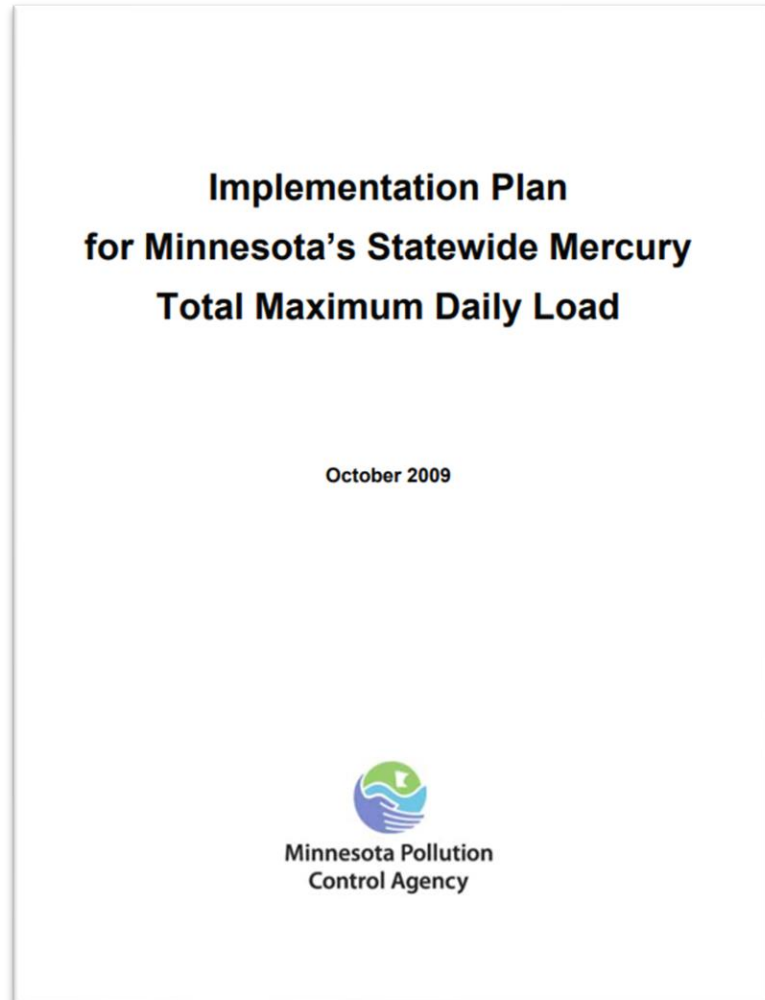
Minnesota's mercury emissions inventory

- Detailed review of the updated 2018 and 2019 emissions inventory
- Second look at 2017 and earlier emissions
- Statewide Mercury TMDL Emissions Inventory Spreadsheet



Regional & national mercury emissions

Mercury reduction goals



- Statewide Mercury TMDL Implementation Plan
 - Recognized that mercury emission reductions are needed from out-of-state sources as well
 - MPCA participates in a number of regional, national, and international organizations
- EPA's National Emissions Inventory (NEI)
 - Triennial inventory of air emissions
 - Regional & national emissions comparison

Regional & national mercury emissions

Mercury reduction goals

	Mercury Emissions (pounds)					Goals	
	2005	2008	2011	2014	2017	2018	2025
Minnesota	3,312	2,843	2,705	2,279	1,528	1,464	789
<i>(% reduction vs. 2005)</i>	<i>0%</i>	<i>14%</i>	<i>18%</i>	<i>31%</i>	<i>54%</i>	<i>56%</i>	<i>76%</i>
Regional	22,170	16,970	14,328	12,389	5,715	9,755	5,232
<i>(% reduction vs. 2005)</i>	<i>0%</i>	<i>23%</i>	<i>35%</i>	<i>44%</i>	<i>74%</i>	<i>56%</i>	<i>76%</i>
<i>Minnesota</i>	3,312	2,843	2,705	2,279	1,528		
<i>Michigan</i>		4,545	3,915	3,864	1,316		
<i>Wisconsin</i>		3,315	1,631	1,405	848		
<i>North Dakota</i>		3,105	2,973	2,320	987		
<i>South Dakota</i>		269	269	226	116		
<i>Iowa</i>		2,893	2,835	2,295	921		
National	225,491	122,278	112,873	103,626	65,668	99,216	53,216
<i>(% reduction vs. 2005)</i>	<i>0%</i>	<i>46%</i>	<i>50%</i>	<i>54%</i>	<i>71%</i>	<i>56%</i>	<i>76%</i>
Global			4,321,055	4,850,170			

Regional & national mercury emissions

Sector comparison

	Energy Production			
	Mercury Emissions (pounds)			
	2008	2011	2014	2017
Minnesota	1,451	1,214	1,039	308
Regional	14,020	11,013	9,456	2,959
National	91,173	81,625	73,979	36,168
	Mercury in Products			
	Mercury Emissions (pounds)			
	2008	2011	2014	2017
Minnesota	726	730	586	525
Regional	950	1,372	1,129	1,373
National	10,544	12,009	9,456	13,113
	Material Processing			
	Mercury Emissions (pounds)			
	2008	2011	2014	2017
Minnesota	666	762	655	696
Regional	2,000	1,943	1,805	1,383
National	20,536	19,185	19,898	15,798

- EPA's National Emissions Inventory (NEI)
 - Sectors (e.g., fuel combustion, industrial processes)
 - Subcategories (e.g., fuel type, industry type)
- Organized by Minnesota's mercury categories
- Largest contributors
 - Energy production (electricity generation)
 - Mercury in products (waste disposal)
 - Material processing (ferrous metals & cement manufacturing)

Moving forward

- Greater emissions reductions are needed to meet the goal of the statewide mercury TMDL.
 - Minnesota met our 2018 reduction goals, but more work is needed to meet the 2025 goal
 - Statewide mercury emissions declined largely due to reductions at large boilers
 - Further reductions are needed from mining-related mercury and mercury in products category
- Continue to promote mercury emission reductions within the state as well as regionally, nationally and globally
 - Regional & national emissions already surpassed the 2018 goal; nearly meeting the 2025 goal
 - Mercury emissions continue to decline largely due to federal boiler standards