Category	Note	Final 2005 Emissions (pounds)	Final 2008 Emissions (pounds)	Final 2011 Emissions (pounds)	Final 2014 Emissions (pounds)	Final 2015 Emissions (pounds)	Final 2016 Emissions (pounds)	Final 2017 Emissions (pounds)	2017 Confidence	2017 Comments
Major Category: Emissions Incidental to Energy Production										
Coal Use (Electric Utility)	1	1716.3	1263.5	938.0	834.9	359.8	172.9	169.5	High	Reductions due to controls installed, moving from coal to natural gas, and other strategies.
Coal Use (Commercial/Institutional/ Industrial)	2	69.2	61.5	95.1	49.0	46.5	48.8	41.9	High	Improved emission estimates for coal boilers (i.e. stack tests to replace EPA default estimates) since 2015.
Volatilization (Coal Ash)	3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	Very Low	This category is included because changes in pollution control equipment and the use of coal ash may make this a significant category.
Petroleum Refining	4	12.9	4.6	38.3	20.7	2.8	3.7	4.1	Medium	Refining mercury estimates fluctuate from year to year.
Petroleum Product Utilization	5	27.1	77.7	66.6	43.2	38.7	88.9	85.5	Very Low	Switched to EPA emission factor in 2008. MPCA may improve confidence in the future.
Wood Combustion	6	30.5	35.6	52.4	79.3	102.7	29.9	28.2	Low	Data from a University of Minnesota study (Nater, Pang. Mercury in Wood - 1999) shows that mercury content of wood is considerably lower than EPA's estimate used for previous years.
Biomass other than Wood	7	0.0	0.0	8.7	0.0	4.4	1.1	0.6	Medium	This category was moved out of the 'Petroleum Product Utilization' category in 2014.
Natural Gas Combustion	8	0.3	0.6	2.0	3.0	3.2	2.7	6.3	Medium	Increases in emission likely due to the increased usage of natural gas as a result of moving away from coal-fired combustion.
Asphalt Manufacturing	30	4.3	3.3	5.6	4.6	4.1	4.1	4.0	Low	
Agriculture, Food, and Kindred Products	31	1.1	1.0	0.4	0.1	1.2	0.2	0.4	Low	
Miscellaneous Industrial Processes	33	0.2	0.2	0.8	0.0	1.9	1.8	1.5	Low	
Wood, Pulp/Paper, and Publishing Products	34	5.1	3.1	5.7	4.0	3.4	3.4	3.5	Low	Primarily emissions from boilers at paper mills.
Subtotal: Emissions Incidental to Energy Production		**1867.1**	**1451.0**	**1213.6**	**1038.8**	**568.7**	**357.5**	**345.4**		
% of Total State Emissions		56%	51%	45%	46%	37%	26%	23%		

Category	Note	Final 2005 Emissions (pounds)	Final 2008 Emissions (pounds)	Final 2011 Emissions (pounds)	Final 2014 Emissions (pounds)	Final 2015 Emissions (pounds)	Final 2016 Emissions (pounds)	Final 2017 Emissions (pounds)	2017 Confidence	2017 Comments
Major Category: Emissions due to the Purposeful Use of Mercury in Products										
Proportional to Mercury Content of Solid Waste										
Volatilization (Solid Waste Collection/Processing)	9	169.0	159.3	278.6	290	290	289.7	181.9	Medium	The previous mass balance study on waste incinerators was updated to include recent years of ash testing data to improve emission factor estimate.
Incineration (On-site Household Waste)	10	40.0	35.3	55	33.2	33.2	33.2	33.2	Low	
Volatilization (Spills/Land Dumping)	11	24.0	23.3	21.2	4.13	4.13	18.2	34.2	Very Low	MPCA was previously using a report by Ed Swain to estimate emissions that followed EPA's population based methodology. For 2014 nonpoint emissions, we used EPA's methodology with updated numbers for per capita emissions.
Volatilization (Landfills)	12	2.1	1.7	3.1	2.5	1	4.3	4.1	Very Low	EPA emission factor used in 2014 nonpoint emissions.
Volatilization (Land Application of Compost)	13	0.2	1.5	0.3	0.8	0.8	0.8	1.4	Low	EPA emission factor used in 2014 nonpoint emissions.
Proportional to Mercury Content of Liquid Waste										
Volatilization (Land Application of Sludge)	14	1.6	0.7	1.5	0.6	0.6	0.6	0.0	Low	
Recycling Activities										
Smelters/Electric Arc Furnaces (EAFs)	15.1	138.7	265.4	83.8	70.5	63.6	55.0	57.0	High	In 2011, one steel melter was separated into this new category from the 2008 combined category of shredding and melting.
Shredders that Recycle Cars/Appliances	15.2			7.66	8.6	4.7	4.7	6.8	Low	In 2011, steel shredders were separated from steel melters into this new category.
Recycling Mercury from Products within MN	16	65.0	1.2	0.02	0.02	0.02	1.2	1.2	Medium	Emissions from fluorescent lightbulb recycling. MPCA learned during mercury rulemaking process that the 2008 estimates were too high.
Non-Ferrous Metal Recycling (Al/Pb/etc.)	17	0.9	0.6	0.3	0.5	0.5	0.5	0.4	Low	

Category	Note	Final 2005 Emissions (pounds)	Final 2008 Emissions (pounds)	Final 2011 Emissions (pounds)	Final 2014 Emissions (pounds)	Final 2015 Emissions (pounds)	Final 2016 Emissions (pounds)	Final 2017 Emissions (pounds)	2017 Confidence	2017 Comments
Dental Mercury										
Dental Preparations	18	62.4	58.8	55.2	15.4	15.4	15.4	15.4	Medium	EPA emission factor used in 2014 nonpoint emissions.
Cremation	19	80.0	97.9	111.7	95	95	96.7	96.7	Medium	A study was performed in conjuction with the U of M to improve estimates for 2014 nonpoint emissions.
Incineration										
Municipal Solid Waste Combustion	20	49.2	30.8	26	33.3	32.1	32.0	25.2	High	Category had Hg emission controls installed prior to 2005.
Incineration (Sewage Sludge)	21.1	8.5	8.4	49.8	11.7	16.7	9.2	8.6	High	Category had Hg emission controls installed prior to 2005.
Incineration (Industrial Sludge)	21.2		0.7	0.01	0.0	0.0	0.0	0.0	High	Category had Hg emission controls installed prior to 2005.
Incineration (Medical Waste)	22	0.4	0.8	0.7	0.3	0.3	0.3	0.3	High	Category had Hg emission controls installed prior to 2005.
Incineration (Hazardous Waste)	23	0.3	0.2	0.05	0.01	0.01	0.4	0.6	High	Category had Hg emission controls installed prior to 2005.
Incineration (Industrial)	24	0.0	7.1	13.1	11.0	0.3	0.2	0.2	High	Category had Hg emission controls installed prior to 2005.
Manufacturing/Use of Non-Dental Mercury-Containing Products										
Mercury Product Manufacturing in MN	25	42.0	22.8	14.3	0.1	0.2	0.2	0.1	High	S J Electro Systems (switch manufacturer) performed emissions testing in 2014. Emissions reported under Toxic Release Inventory.
General Laboratory Use	26	10.0	8.9	7.7	7.9	7.9	7.7	9.3	Very Low	
Volatilization (Dissipative Use)	27	0.8	0.8	0.06	0.05	0.05	0.5	0.5	Low	EPA emission factor used in 2014 nonpoint emissions.
Subtotal: Associated to Purposeful Use of Mercury		**695.1**	**726.0**	**730.2**	**585.7**	**566.5**	**570.8**	**477.0**		
% of Total State Emissions		21%	26%	27%	26%	30%	41%	31%		

Category	Note	Final 2005 Emissions (pounds)	Final 2008 Emissions (pounds)	Final 2011 Emissions (pounds)	Final 2014 Emissions (pounds)	Final 2015 Emissions (pounds)	Final 2016 Emissions (pounds)	Final 2017 Emissions (pounds)	2017 Confidence	2017 Comments
Major Category: Emissions Incidental to Material Processing										
Ferrous Mining/Processing	28	734.8	648.5	745.4	651.9	509	441.0	683.0	High	Large production increase across the industry from 2016-2017 (~10m long tons more) 2017 production: ~37.7m long tons
Thermal treatment of soil	29	0.8	0.00	0.00	0.04	0.04	0.00	0.00	Low	
Mineral Products	32	13.8	17.2	16.2	3.0	8.5	9.0	13.1	High	Improved emission estimates since 2014 (i.e., emissions tests instead of EPA default factors).
Subtotal: Emissions Incidental to Material Processing		**749.4**	**665.8**	**761.6**	**655.0**	**517.54**	**450.0**	**696.0**		
% of Total State Emissions		23%	23%	28%	29%	33%	33%	46%		
STATEWIDE EMISSIONS TOTAL		**3,312**	**2,843**	**2,705**	**2,279**	**1,653**	**1,378**	**1,518**		

General Notes:

The 2017 mercury emissions are a combination of 2017 point source emissions and 2014 non-point source emissions.

Confidence intervals: High +/- 10%; Medium +/- 25%; Low +/- 50%; Very Low +/- 100% or more.

The note numbers for each cateogry correspond to the note numbers in the TMDL Implementation Plan Appendix 5, where descriptions of categories and estimates are identified.

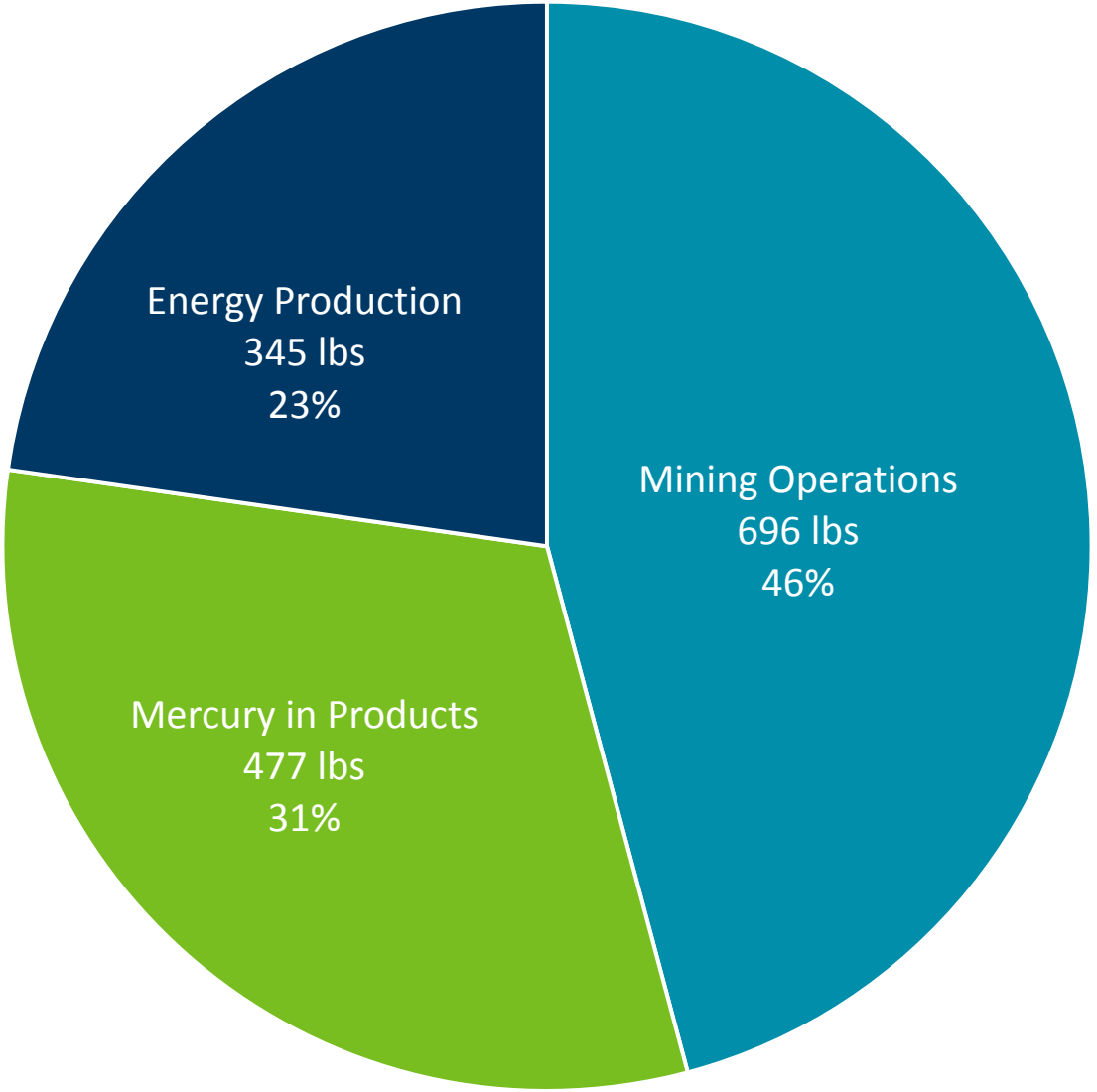
Mercury Emissions Projections Bar Chart Notes:

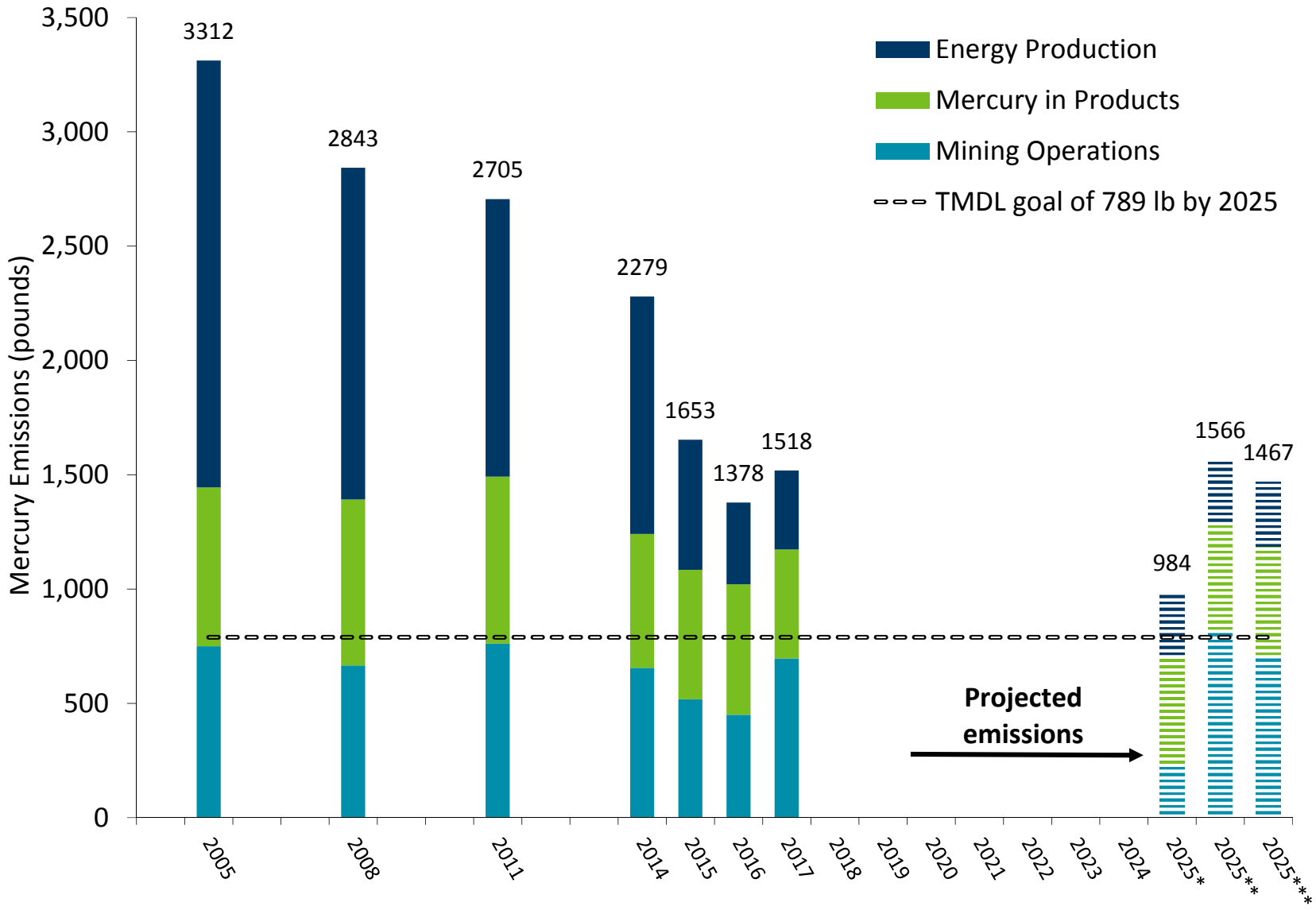
* This 2025 projection is based on the ferrous mining/processing facilities in northern MN meeting the required 72% reduction specified in Minn. R. 7007.0502.

** This 2025 projection is based on the emissions estimates contained in the mercury reduction plans submitted by the ferrous mining/processing facilities in northern MN.

*** This 2025 projection is based on the MPCA revisions (as of this date) to the mercury reduction plans submitted by the ferrous mining/processing facilities in northern MN.

2017 Mercury Emissions by Major Category




Mercury Emissions (pounds)
3,500
3,000
2,500
2,000
1,500
1,000
500
0
3312
2843
2705
2279
1653
1378
1518
984
1566
1467
Energy Production
Mercury in Products
Mining Operations
TMDL goal of 789 lb by 2025
Projected emissions
2005
2008
2011
2014
2015
2016
2017
2018
2019
2020
2021
2022
2023
2024
2025*
2025**
2025***