

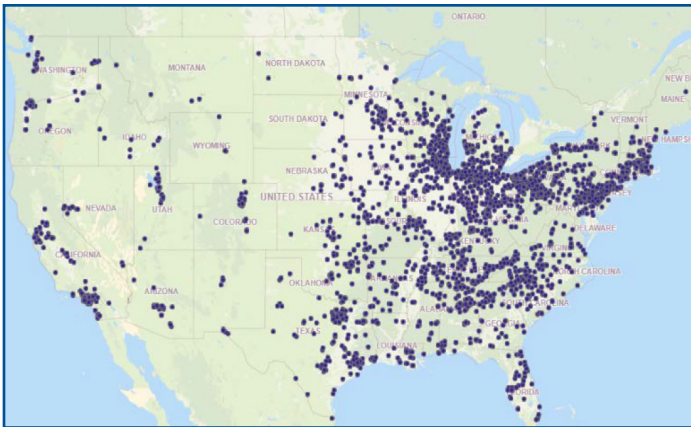
Metal Manufacturing and Fabrication

P2 National Emphasis Area (FY22-23)
P2-TRI Fact Sheet



EPA adopted six [national emphasis areas](#) (NEAs) for the FY 2022/2023 pollution prevention (P2) grant cycle. This fact sheet summarizes environmental and P2 information for one of the NEAs: the **metal manufacturing and fabrication sector** (NAICS 331 and 332). According to the Census Bureau, this sector includes 58,435 establishments.¹ About 7 percent of these establishments (facilities) reported to the [Toxics Release Inventory \(TRI\)](#) for 2020.¹ TRI tracks the management of toxic chemicals as reported by U.S. industrial facilities. Annually, facilities report to TRI how much of each chemical is recycled, combusted for energy recovery, treated, and disposed of or otherwise released to the environment.

Locations of TRI Metal Manufacturing and Fabrication Facilities, 2020



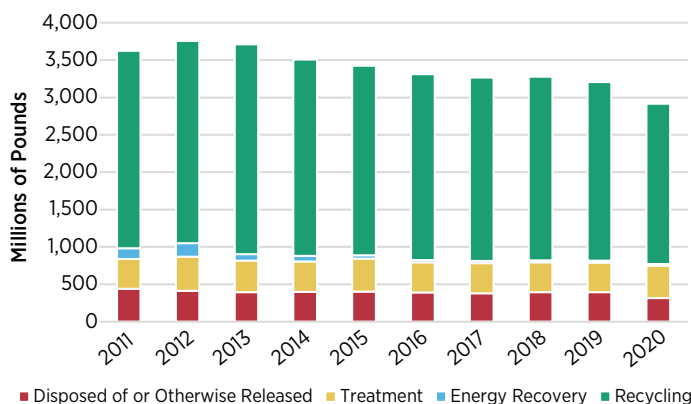
TRI Quick Facts for 2020

	Metal Manufacturing and Fabrication	All Sectors
Number of TRI Facilities	4,270	21,022
Total Production-Related Waste Managed (lb)	2.9 billion	28.3 billion
Total On-site and Off-site Disposal or Other Releases (lb)	299 million	3.0 billion
Total On-site (lb)	168 million	2.7 billion
• Air (lb)	41.0 million	550 million
• Water (lb)	25.0 million	194 million
• Land (lb)	102 million	1.95 billion
Total Off-site (lb)	131 million	348 million

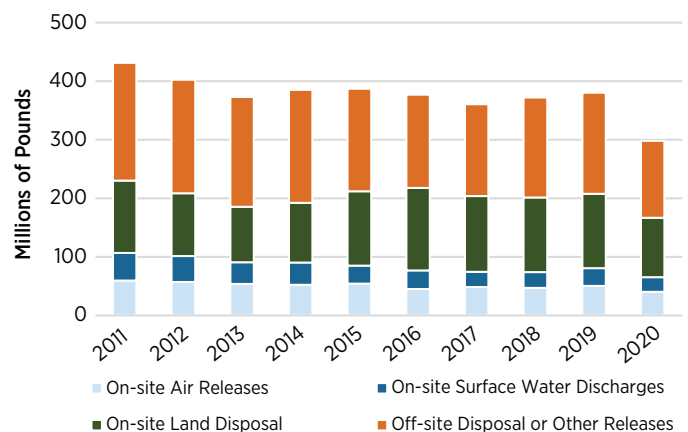
EPA encourages facilities to first eliminate the production of waste at its source (source reduction) prior to recycling, energy recovery, treatment, or disposal. The charts below show quantities of TRI chemicals released or otherwise managed as waste by the sector as reported to TRI. P2 technical assistance providers and others may be able to use the information below to identify opportunities that prevent chemical releases through source reduction activities. Information can be explored in more depth at [EPA's TRI P2 Search tool](#).

Metal Manufacturing and Fabrication

Waste Management Approaches



Total Releases by Media



For more information on P2 and the EPA's P2 Program, please contact the P2 Hub at: p2hub@epa.gov or 202-566-0799 or visit www.epa.gov/P2

¹Data source: 2020 TRI National Analysis data released October 2021; and U.S. Census Bureau, 2017 Economic Census

Metal Manufacturing and Fabrication

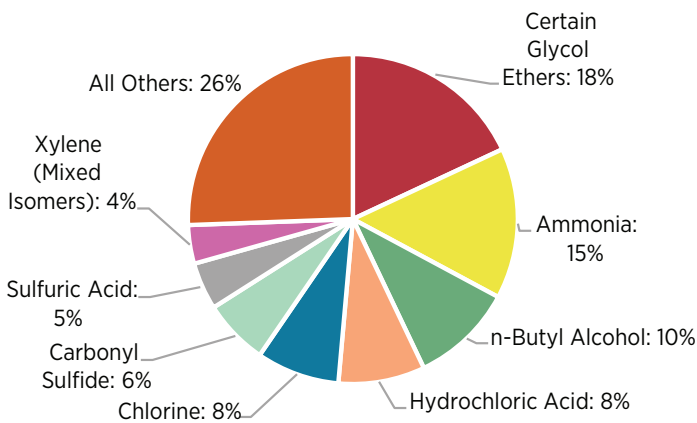
P2 National Emphasis Area (FY22-23)
P2-TRI Fact Sheet



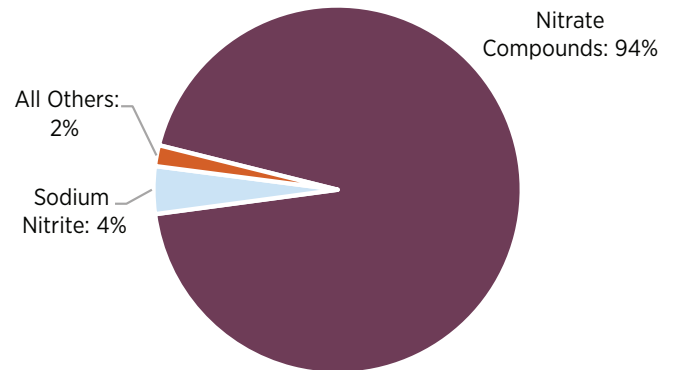
The following charts show the TRI chemicals released on site to air and water by facilities in the metal manufacturing and fabrication sector as a whole and for three selected metal manufacturing and fabrication subsectors: Foundries (NAICS 3315); Coating, Engraving, Heat Treating, and Allied Activities (NAICS 3328); and Architectural and Structural Metals Manufacturing (NAICS 3323). In these charts, each metal and its compounds are combined.

Metal Manufacturing and Fabrication

Releases to Air, 2020
41.0 million pounds

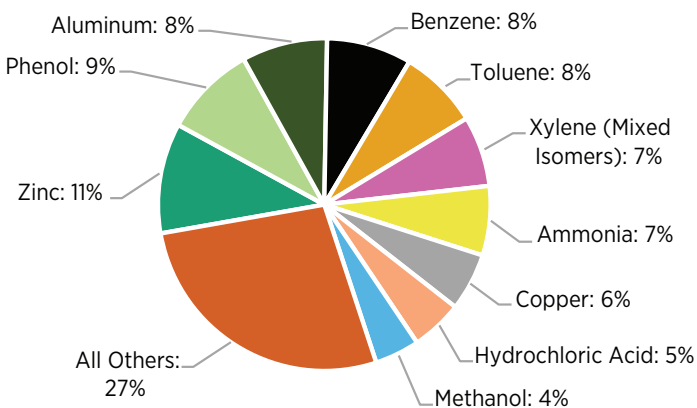


Releases to Water, 2020
25.0 million pounds

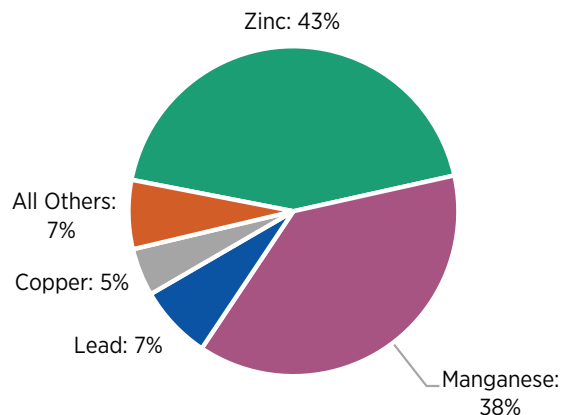


Foundries

Releases to Air, 2020
1.6 million pounds



Releases to Water, 2020
23,996 pounds



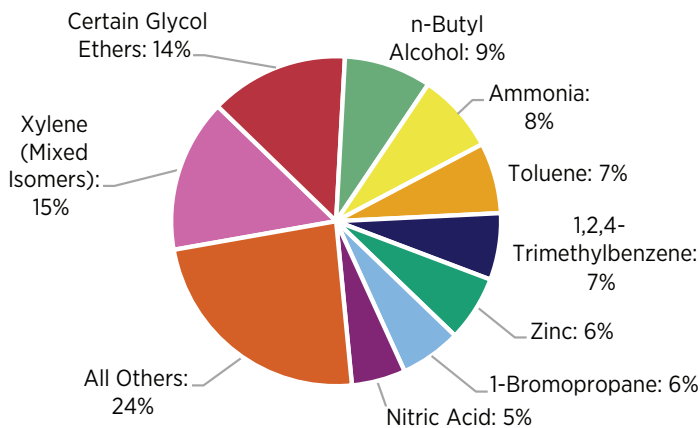
Metal Manufacturing and Fabrication

P2 National Emphasis Area (FY22-23)
P2-TRI Fact Sheet

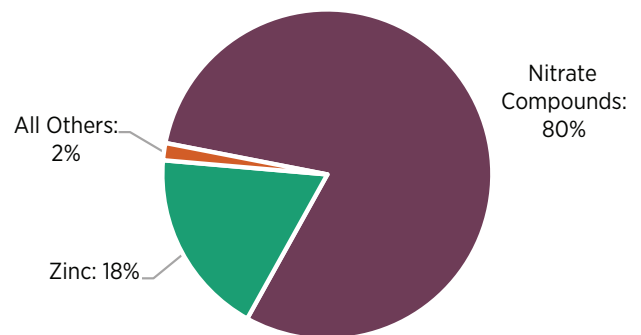


Coating, Engraving, and Heat Treating

Releases to Air, 2020
2.5 million pounds

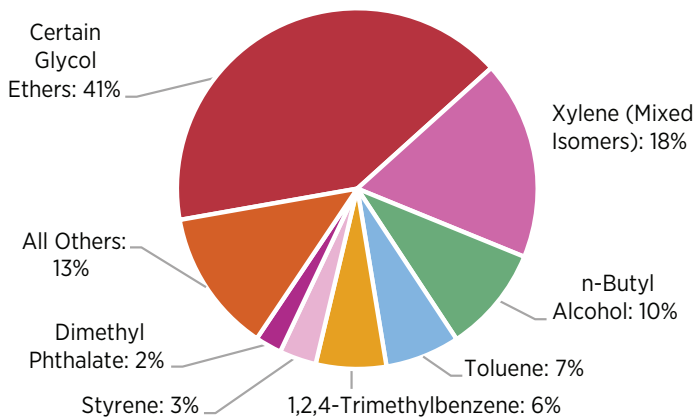


Releases to Water, 2020
78 thousand pounds

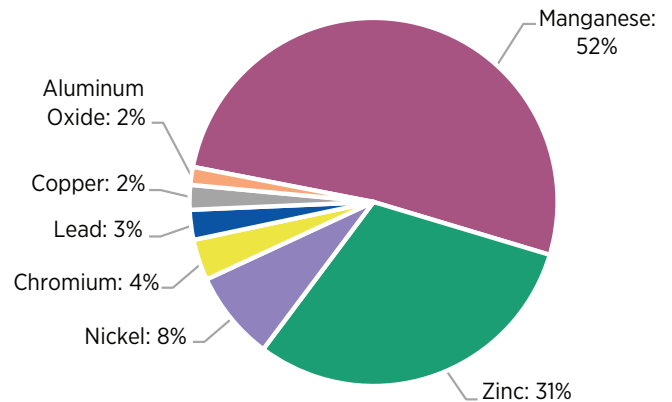


Architectural and Structural Metals Manufacturing

Releases to Air, 2020
1.4 million pounds



Releases to Water, 2020
1,065 pounds



Metal Manufacturing and Fabrication

P2 National Emphasis Area (FY22-23)
P2-TRI Fact Sheet

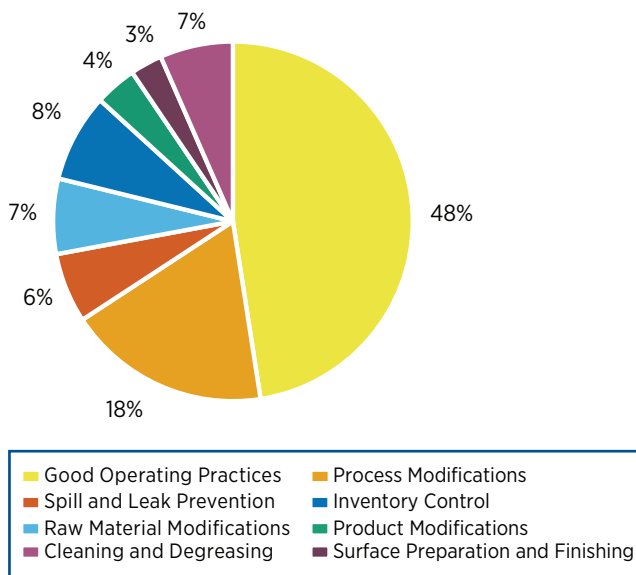


P2 Activities Reported to TRI

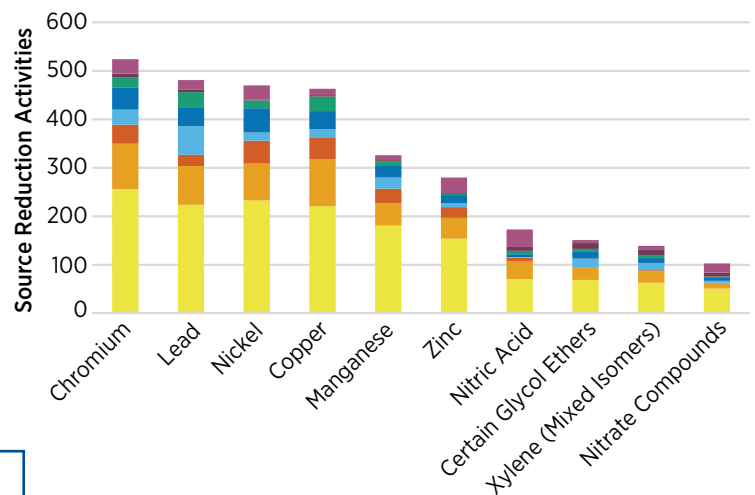
The figures below illustrate the source reduction activities reported to TRI by facilities in the subsectors comprising the metal manufacturing and fabrication sector for 2016 - 2020. In the bar chart, the number of source reduction activities reported for each metal and its compounds are combined.

Metal Manufacturing and Fabrication, 2016-2020

Source Reduction Activities



Source Reduction Activities by Chemical



Metal Manufacturing and Fabrication

P2 National Emphasis Area (FY22-23)
P2-TRI Fact Sheet



P2 Opportunities

Examples of P2 achievements in the metal manufacturing and fabrication sectors identified from published sources are listed below. For information on additional P2 opportunities, see [EPA's P2 Resources Search tool](#) and the [TRI Pollution Prevention Search tool](#). Some of the sources below link to non-EPA web sites. EPA cannot attest to the accuracy of non-EPA sources and providing links to a non-EPA source is not an endorsement by EPA of the source or the information it contains.

- **Reducing scrap metal.** In metal fabrication, using materials more efficiently can result in reduced scrap metal generation. For example, facilities have revised dimensions of raw material purchases to more closely match the dimensions of cut pieces, reducing scrap during production. Others have implemented nesting software programs to improve parts yield from raw materials.
 - The article, [Metal Fabrication Design Practices that Reduce Scrap](#), describes a product modification that leveraged nesting practices for cutting sheet metal.
 - The [TRI Pollution Prevention Search tool](#) includes numerous examples of facilities reporting scrap metal reductions after implementing nesting software when ordering or preparing materials.
- **Extending the lifetime of coolant fluids.** Coolant fluids might constitute the largest waste stream generated as a by-product of regular machining operations. Metal and oil contamination can be prevented by installing equipment such as bag and cartridge filters, centrifuges, or settling tanks to physically separate and remove contaminants. For facilities where this equipment was previously installed, improving maintenance might increase equipment efficiency and result in further P2.
 - [Coolant Maintenance for Machining Operations](#) describes proper coolant selection and best practices in extending coolant life by minimizing contamination and improving usage monitoring.
- **Monitoring plating bath concentrations and proper removal processes.** Plating baths are a major source of wastes within metal fabrication facilities. Plating processes often involve heavy metals, strong acids and bases, and other hazardous chemicals that create hazardous work environments and waste. To prevent pollution, facilities have installed chemical concentration monitoring equipment that detects when plating chemicals must be added or replaced. Proper removal and transfer techniques also extend bath life by reducing contamination or loss of chemicals.
 - The [University of Minnesota Technical Assistance Program \(MnTAP\)](#) describes dragout reduction, concentration control, and alternative plating solutions to help facilities maximize the lifetime and efficiency of plating baths.
 - EPA's [P2 Metal Finishing fact sheet](#) provides more information specific to P2 strategies for metal finishing operating including extending bath life, optimizing rinse tanks, and reducing water use.