

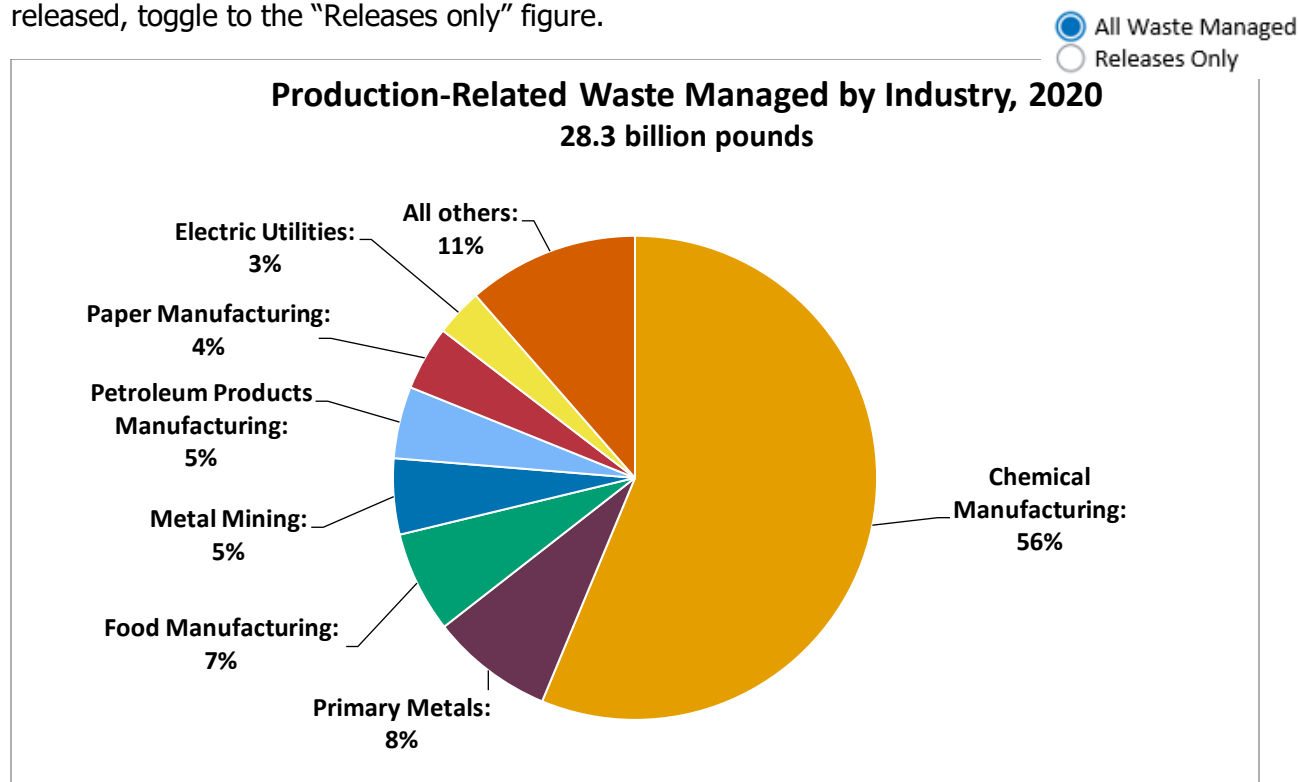
Comparing Industry Sectors

This section examines how industry sectors manage Toxics Release Inventory (TRI) chemical waste. Looking at data from individual sectors can highlight progress made in improving environmental performance and reveal opportunities for better waste management practices.

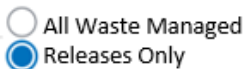
Industries subject to TRI reporting requirements vary substantially in size, scope, and business type. As a result, the amounts and types of chemicals used, generated, and managed by facilities across industrial sectors often differ. For facilities in the same sector, however, the processes, products, and regulatory requirements are often similar, resulting in similar use, manufacture or processing of TRI chemicals.

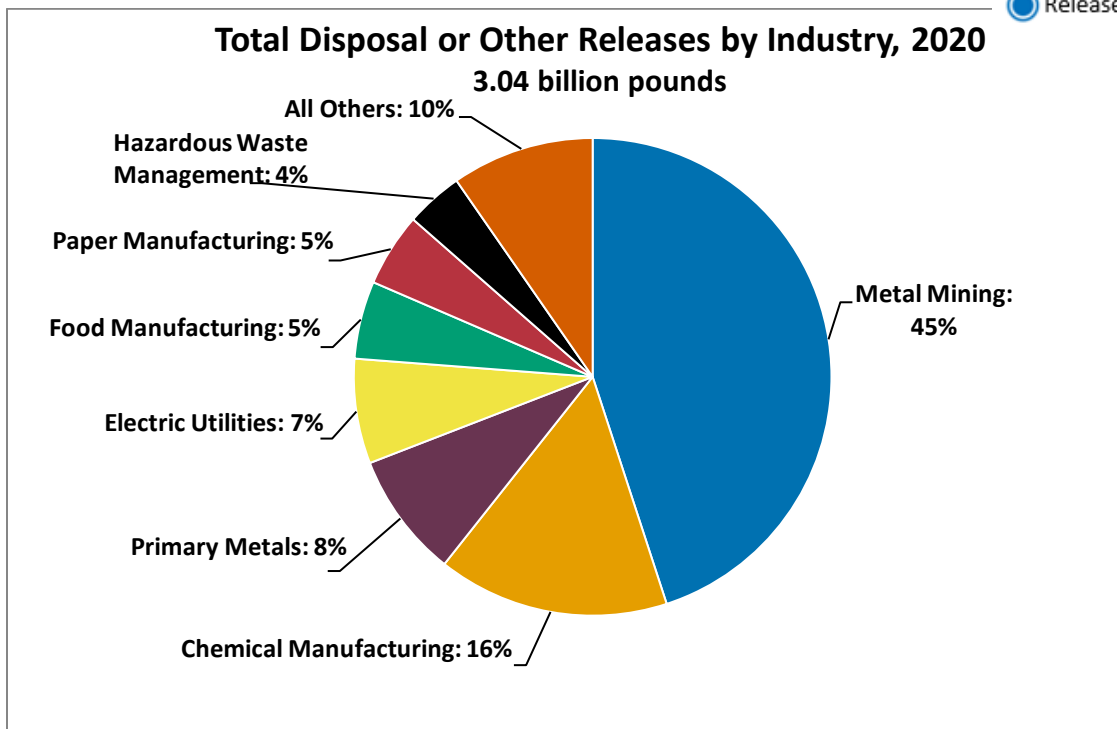
This section presents trends in key sectors' [production-related waste managed](#), including TRI chemical [releases](#) into the environment. For analytical purposes, the TRI Program has combined the North American Industry Classification System (NAICS) codes at the 3- and 4-digit levels, creating 29 industry sector categories. To learn more about which business activities are subject to TRI reporting requirements, [see this list of covered NAICS codes](#).

The following pie chart shows the quantities of TRI chemical waste managed through recycling, energy recovery, treatment, and disposal or other releases. For more details on quantities released, toggle to the "Releases only" figure.



Seven industry sectors reported 89% of the TRI production-related waste managed in 2020. Most of this waste originated from the chemical manufacturing sector (56%).

The following pie chart shows the industry sectors that reported the most releases 



This pie chart shows that 4 of the 29 TRI sectors accounted for 76% of the quantities of TRI chemicals disposed of or otherwise released: metal mining (45%), chemical manufacturing (16%), primary metals (8%), and electric utilities (7%).

For more details on how the amounts and proportions of TRI chemicals managed as waste have changed over time, see the [production-related waste managed by industry trend graph](#).

For more information on the breakdown of these releases by environmental medium, see [air releases by industry](#), [water releases by industry](#) and [land disposal by industry](#).

TRI Data Considerations
As with any dataset, there are several factors to consider when using the TRI data. Key factors associated with data used in the National Analysis are summarized in the Introduction . For more information see Factors to Consider When Using Toxics Release Inventory Data .

Manufacturing Sectors

This section examines how TRI chemical wastes are managed in the manufacturing sectors (defined as facilities reporting their primary NAICS codes as 31-33).

MANUFACTURING

What the Sector Does

The manufacturing sectors are goods-producing industries that transform materials into new products. These sectors include businesses involved in the production of food, textiles, paper, chemicals, plastics, petroleum products, metal products, electronics, furniture, vehicles, equipment, and other products.



THE SECTOR EMPLOYS 11.5 MILLION PEOPLE

U.S. Census Annual Survey of Manufactures 2019 data



THE SECTOR CONTRIBUTES 2.3 TRILLION TO U.S. GDP

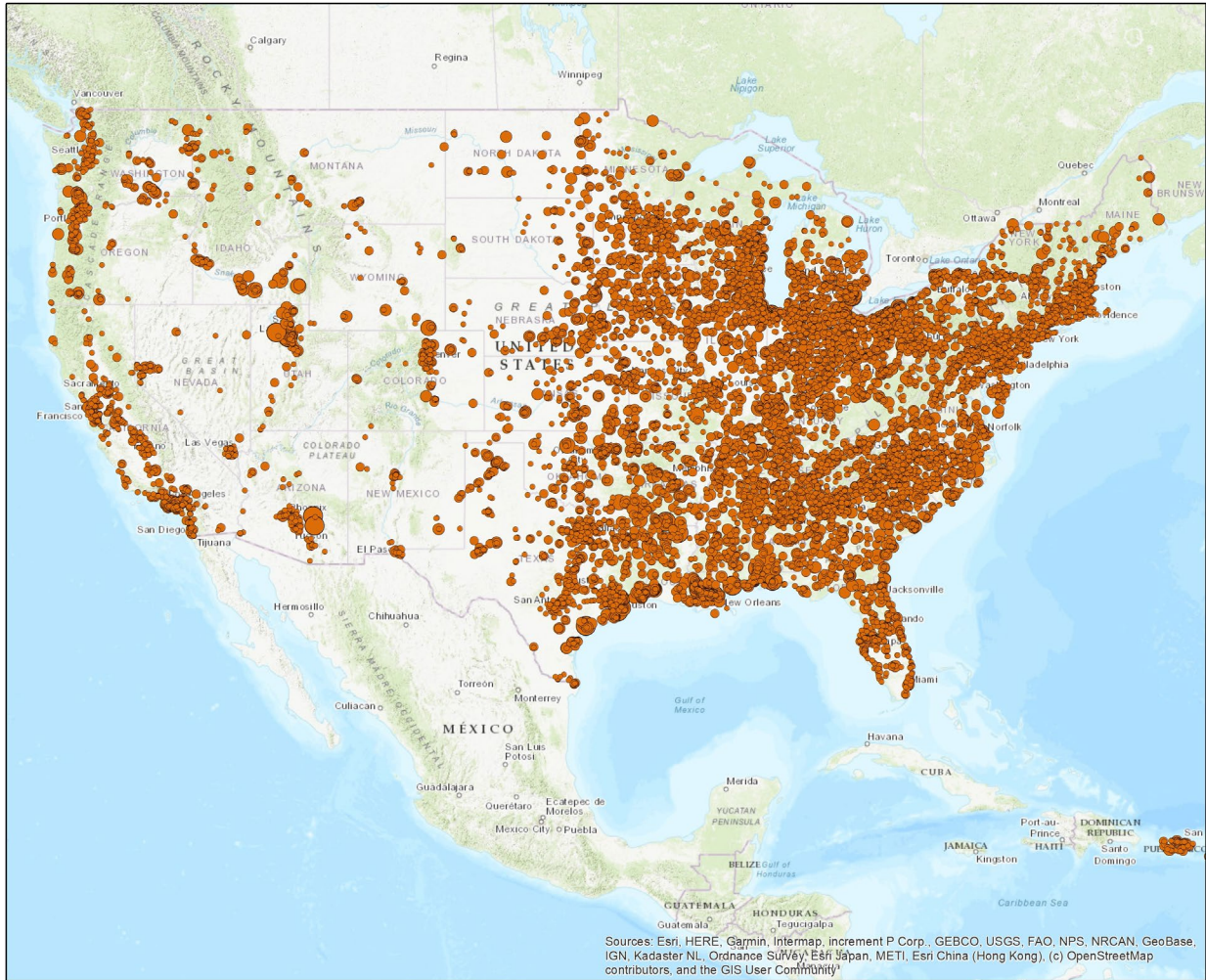
In value-added. Bureau of Economic Analysis, Year 2020 data.



18,863 facilities in the sector report to TRI

U.S. EPA TRI, Reporting Year 2020

This map shows the locations of the manufacturing facilities that reported to TRI for 2020, sized by their relative releases. Click on a facility for details on its TRI reporting.



Manufacturing Facilities Reporting to TRI, 2020

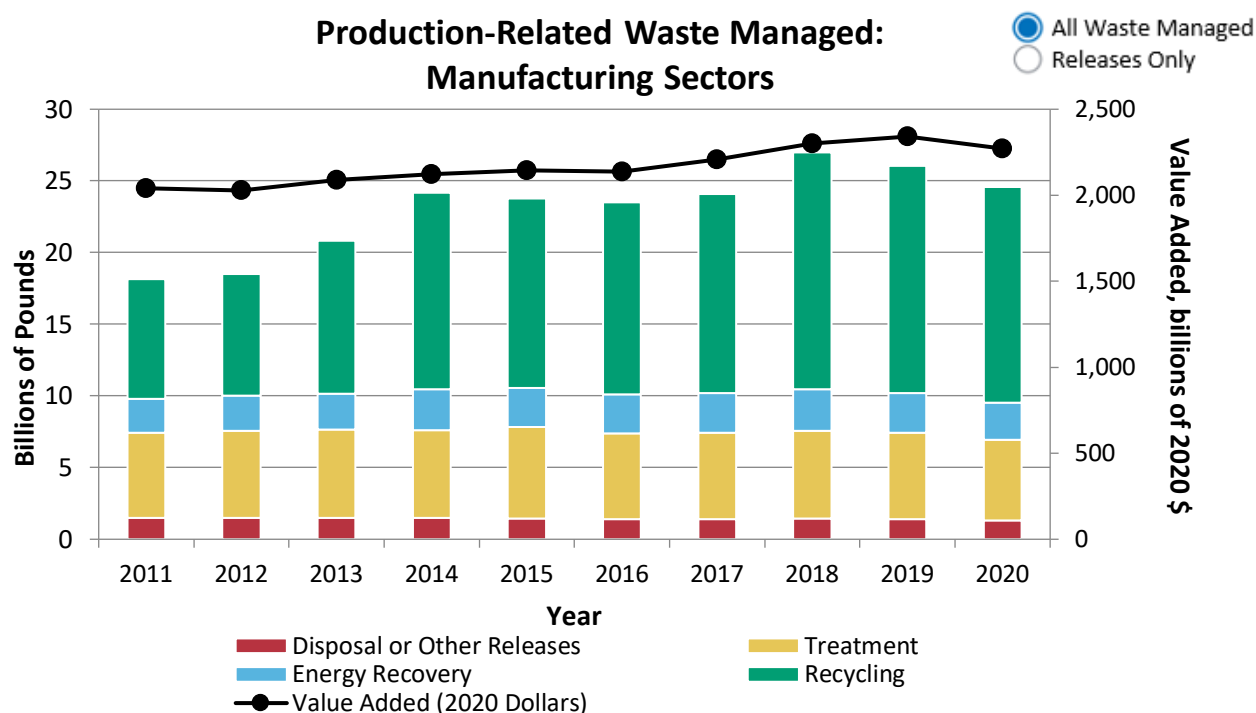
[View Larger Map](#)

For 2020, nearly 90% of the facilities that reported to TRI were in a manufacturing sector. Manufacturing sectors accounted for most (89%) of the 28.3 billion pounds of production-related waste managed for 2020. Two subsectors of manufacturing, [chemical manufacturing](#) and [cement manufacturing](#), are highlighted in more detail later in this section.

The TRI-covered industry sectors not categorized under manufacturing include [metal mining](#), coal mining, [electric utilities](#), chemical wholesalers, petroleum terminals, hazardous waste management, and others.

Manufacturing Waste Management Trend

The following graph shows the 10-year trend in TRI chemical waste managed through recycling, energy recovery, treatment, and disposal or other releases by the manufacturing sectors. For more details on quantities released, toggle to the "Releases only" graph.



Note: For comparability, trend graphs include only those chemicals that were reportable to TRI for all years presented.

From 2011 to 2020:

- Quantities of production-related waste managed by the manufacturing sectors increased through 2018. Since then, quantities of waste managed have decreased.
- From 2011 to 2020, releases and treatment of chemical waste decreased, while recycling and combustion for energy recovery increased.
- It is important to consider the influence the economy has on wastes generated. This figure includes the trend in the manufacturing sectors' value added (represented by the black line as reported by the [Bureau of Economic Analysis, Value Added by Industry](#)). Since 2011, value added by the manufacturing sectors increased by 11%.

- Waste managed by the manufacturing sectors increased by 35% since 2011, driven by increased recycling. The large increase in recycled chemical waste starting in 2014 was driven by several facilities that each reported recycling one billion pounds or more annually in recent years.

What is Value Added?

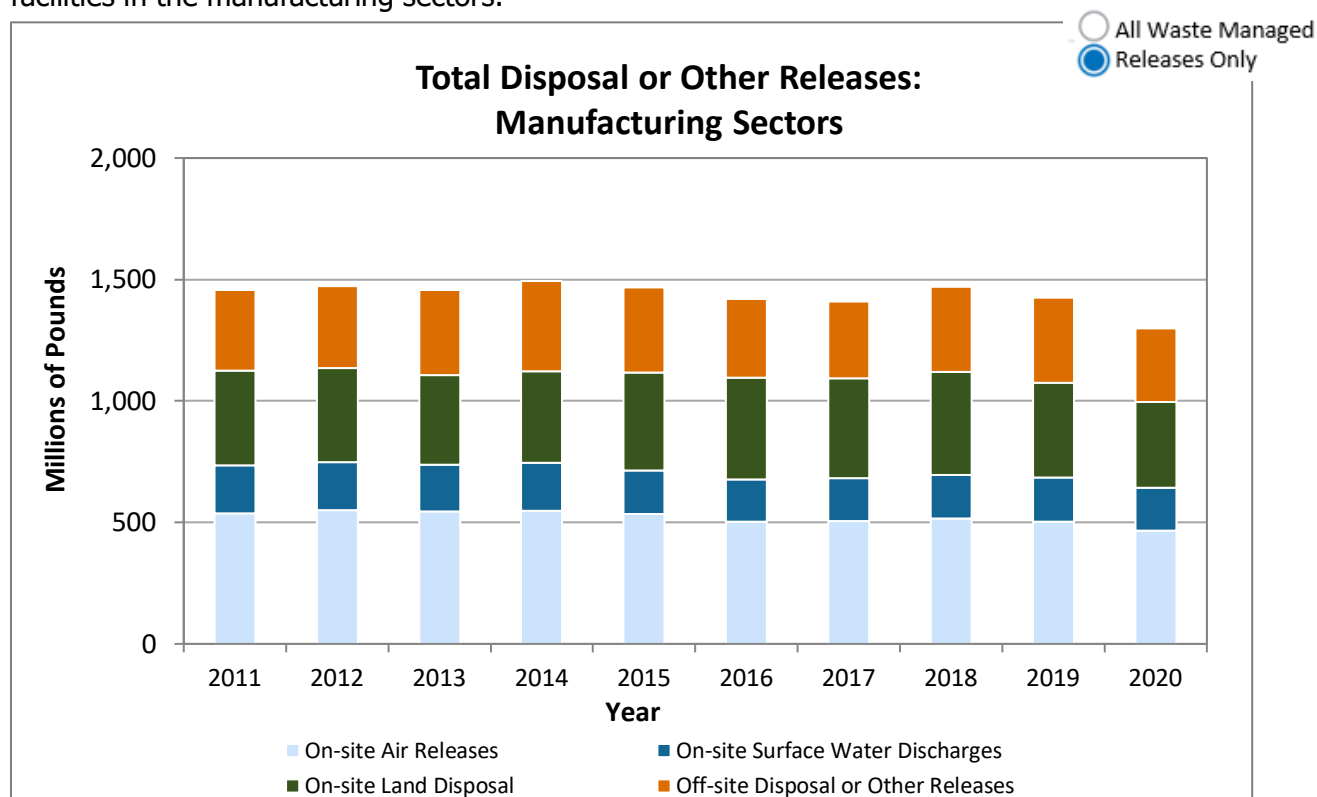
An industry's value added is the market value it adds in production; it is the difference between the price at which it sells its products and the cost of its inputs. Value added for all U.S. industries combined is equal to the nation's gross domestic product.

From 2019 to 2020:

- Production-related waste managed decreased by 1.9 billion pounds (-7%), while value added decreased slightly (-3%). Annual changes in waste managed are driven by a few facilities.
- In 2020, only 5% of the manufacturing sectors' production-related waste generated was released into the environment, while the rest was managed through treatment, energy recovery, and recycling.

Manufacturing Releases Trend

The following graph shows the 10-year trend in annual quantities of TRI chemicals released by facilities in the manufacturing sectors.



Note: For comparability, trend graphs include only those chemicals that were reportable to TRI for all years presented.

From 2011 to 2020:

- TRI chemical releases from the manufacturing sectors decreased by 11%, primarily due to reductions in air emissions (70.1 million pounds) and on-site land disposal (38.7 million pounds).
- Releases to water declined by 11% and off-site disposal or other releases declined by 8%.

From 2019 to 2020:

- Releases decreased by 126 million pounds (-9%). Decreases in disposal or other releases reported by facilities in the primary metals manufacturing sector accounted for more than half of this change.

Source Reduction in the Manufacturing Sectors:

In 2020, 6% of manufacturing facilities initiated over 2,600 source reduction activities to reduce TRI chemical use and waste creation. The most commonly reported types of source reduction activities were Good Operating Practices and Process Modifications. For example:

- A kitchen cabinet manufacturing facility reduced its use of xylene by switching to high solid coatings which require less material to coat parts. [[Click to view facility details in the TRI P2 Search Tool](#)]
- A motor vehicle parts manufacturer adjusted the air pressure on paint regulators to reduce paint usage, which resulted in a reduction in ethylbenzene waste. [[Click to view facility details in the TRI P2 Search Tool](#)].

You can [learn more about pollution prevention opportunities in this sector by using the TRI P2 Search Tool](#). Facilities interested in exploring pollution prevention opportunities at their site can contact their [Regional P2 Coordinator](#) to arrange a free onsite P2 assessment.


Chemical Manufacturing

This section examines how TRI chemical wastes are managed in the chemical manufacturing sector (defined as facilities reporting their primary NAICS code as 325).


CHEMICAL MANUFACTURING

What the Sector Does

Chemical manufacturers convert raw materials into thousands of different products, including basic chemicals, products used by other manufacturers (such as synthetic fibers, plastics, and pigments), pesticides, and cosmetics, to name a few.




THE SECTOR
EMPLOYS
751,000
PEOPLE



U.S. Census Annual Survey of Manufactures
2019 data

THE SECTOR
CONTRIBUTES
\$395 BILLION
TO U.S. GDP

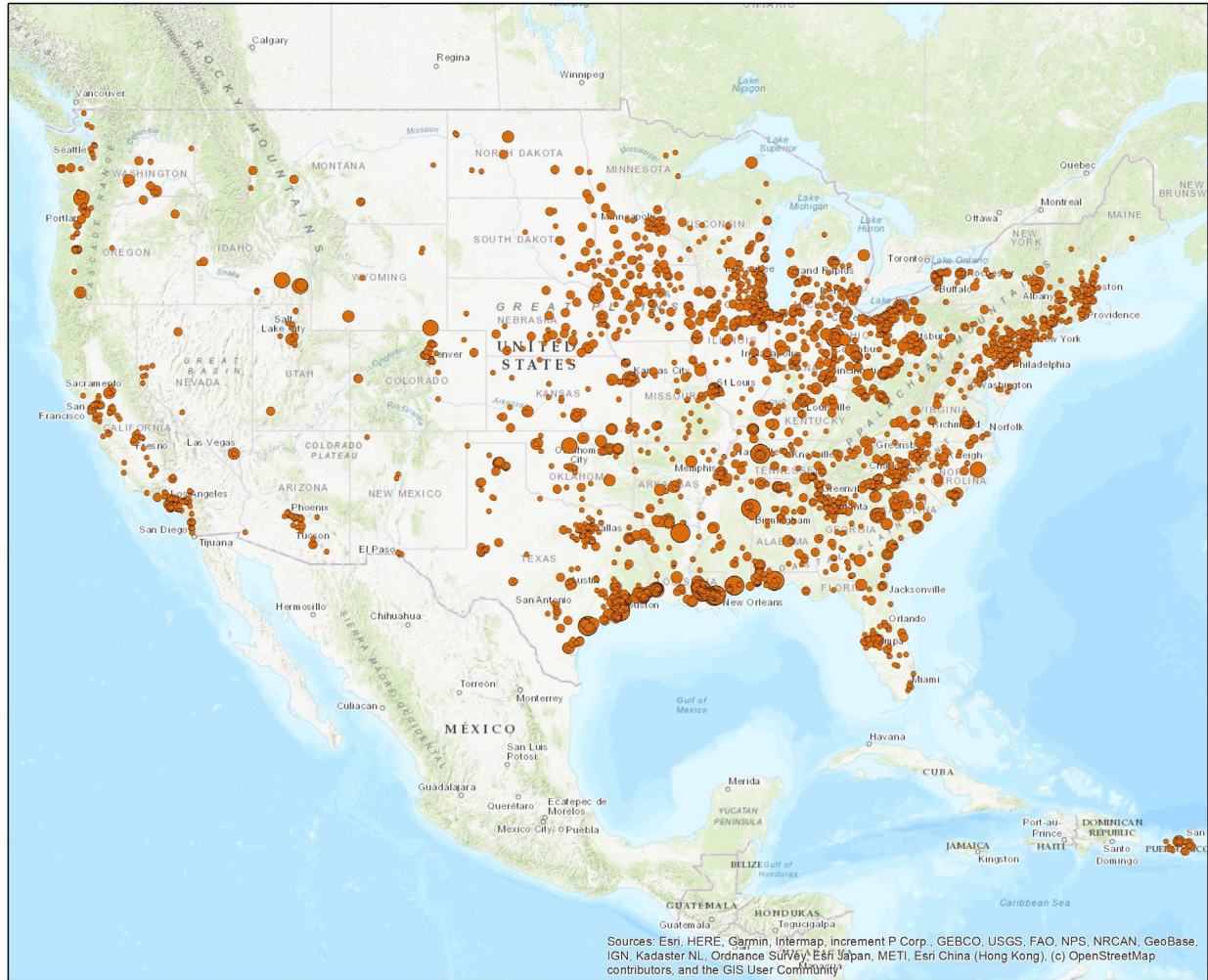


In value-added. Bureau of Economic Analysis, Year 2020 data

3,411 facilities in the sector report to TRI

U.S. EPA TRI, Reporting Year 2020

This map shows the locations of the chemical manufacturing facilities that reported to TRI for 2020, sized by their relative releases. Click on a facility for details on its TRI reporting.

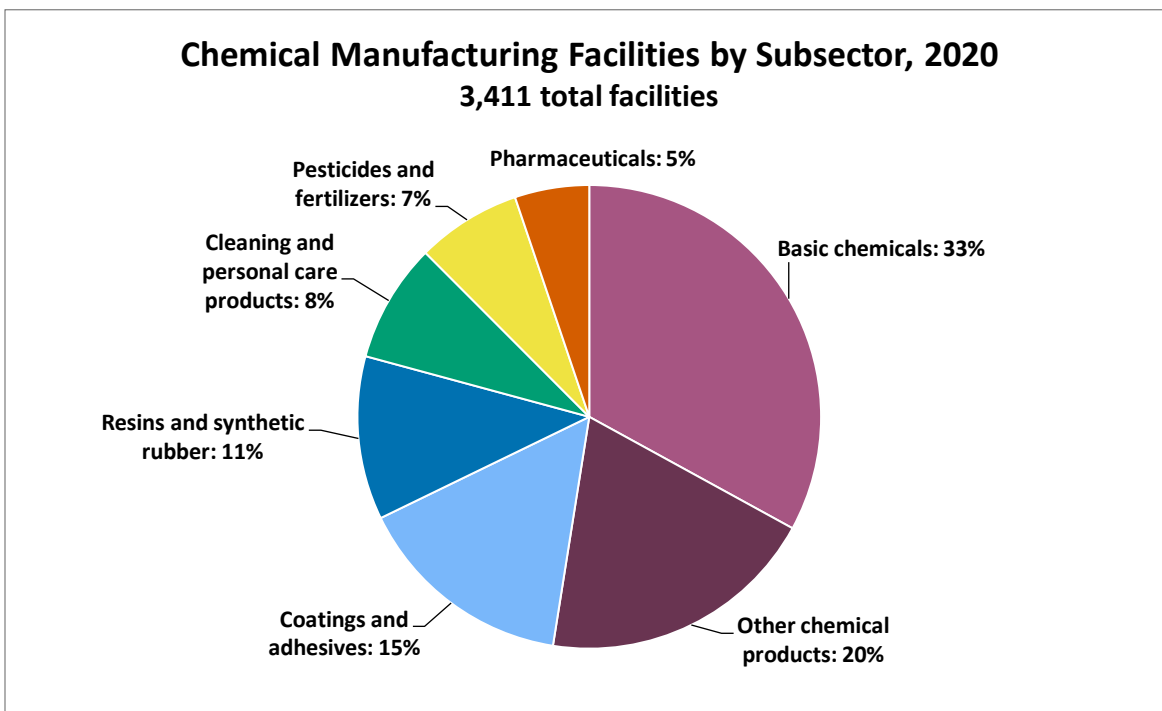


Chemical Manufacturing Facilities Reporting to TRI, 2020

[View Larger Map](#)

For 2020, more facilities reported to TRI from the chemical manufacturing sector than any other industry sector (3,411; 16% of facilities that reported for 2020). This sector reported 56% of all waste managed reported to TRI, more than any other sector.

This large and diverse sector includes facilities producing basic chemicals and those that manufacture products through further processing of chemicals. The chart below shows the number of facilities by chemical manufacturing subsectors that reported to TRI for 2020.



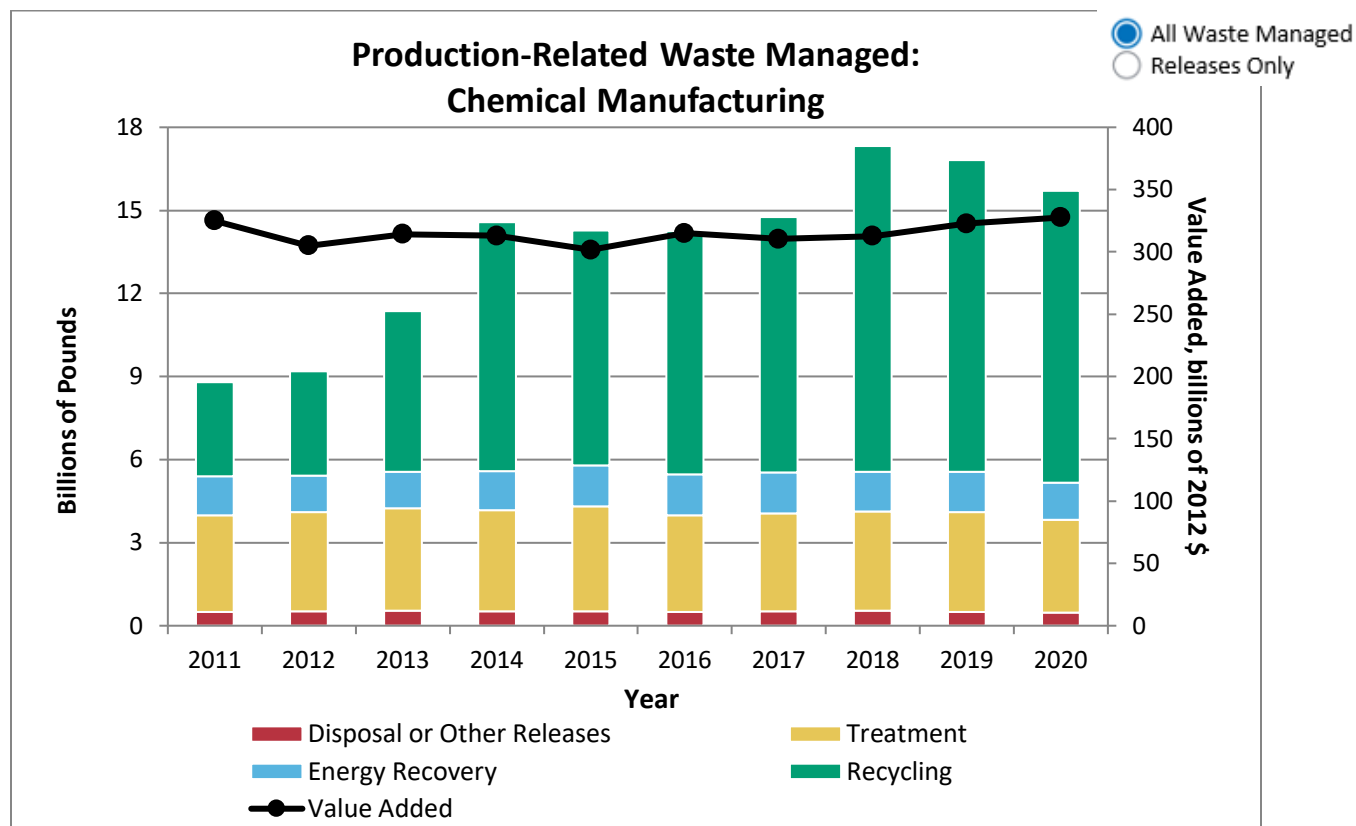
Note: Percentages do not sum to 100% due to rounding.

Operations in the chemical manufacturing sector include:

- Basic chemicals facilities produce chemicals by basic processes, such as thermal cracking and distillation. Products include petrochemicals, industrial gases, synthetic dyes and pigments, and many other organic and inorganic chemicals.
- Coatings and adhesives facilities mix pigments, solvents, and binders into architectural and industrial paints; manufacture paint products such as paint removers and thinners; and manufacture adhesives, glues, and caulking compounds.
- Resins and synthetic rubber facilities manufacture resins, plastic materials, synthetic rubber, and fibers and filaments.

Chemical Manufacturing Waste Management Trend

The following graph shows the annual quantities of TRI chemical waste managed through recycling, energy recovery, treatment, and disposal or other releases by the chemical manufacturing sector. For more details on quantities released, toggle to the “Releases only” graph.



Note: For comparability, trend graphs include only those chemicals that were reportable to TRI for all years presented.

From 2011 to 2020:

- Quantities of production-related waste managed by the chemical manufacturing sector increased by 79%, while the sector’s value added (represented by the black line as reported by the [Bureau of Economic Analysis, Value Added by Industry](#)) increased by 1%.
 - Trends in waste [recycled](#) by chemical manufacturers are driven by a few facilities. For example, the large increase in chemical waste recycled starting in 2014 compared to previous years was primarily due to increased quantities of recycling reported by chemical manufacturers, with an increase in the quantity of

cumene recycled by one facility and dichloromethane (methylene chloride) recycled by two other facilities.

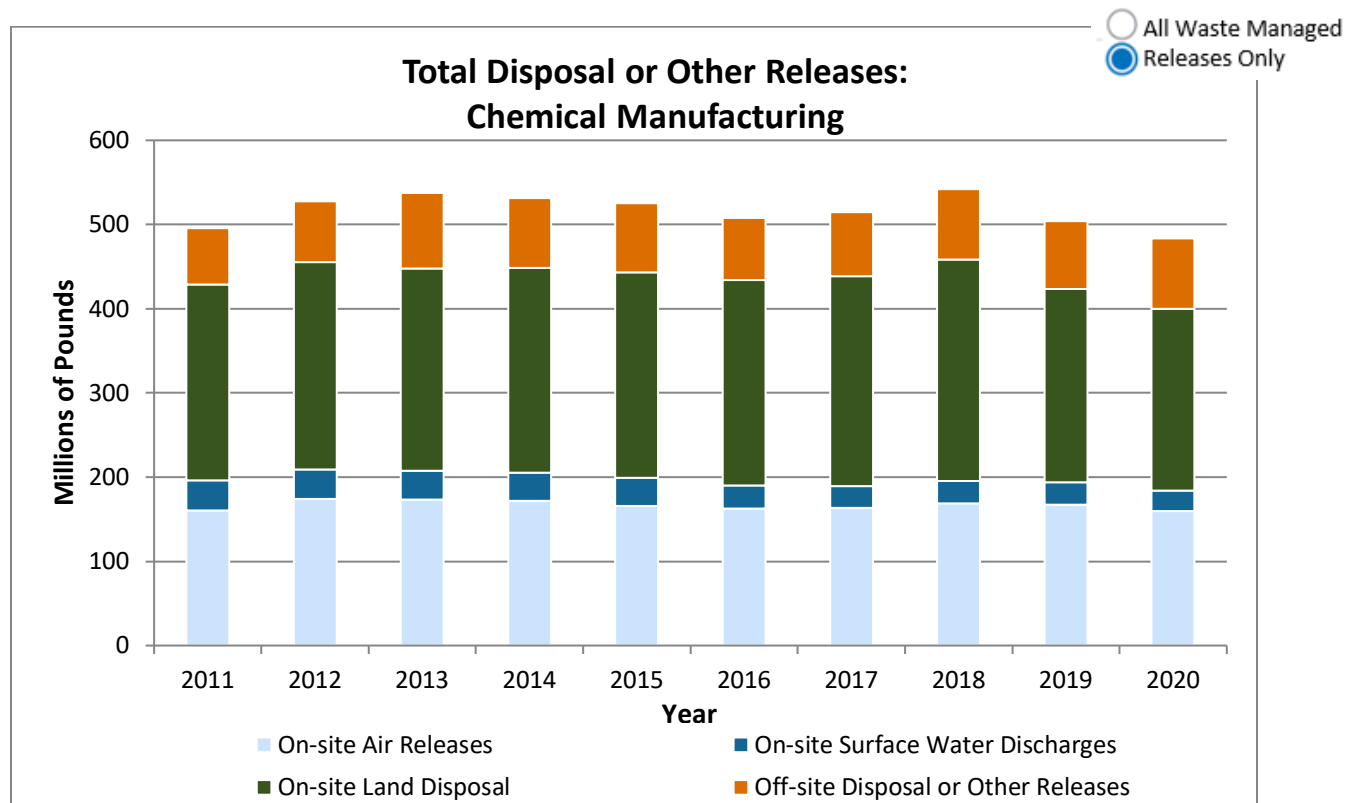
- Quantities of TRI chemicals treated, released, or combusted for energy recovery decreased, while the quantities of TRI chemicals recycled increased.

From 2019 to 2020:

- Production-related waste managed at chemical manufacturing facilities decreased by 1.1 billion pounds (-7%), driven by a reduction in quantities recycled by two facilities in the sector.
- In 2020, 3% of this sector's waste was released into the environment, while the rest was managed through treatment, energy recovery, and recycling.

Chemical Manufacturing Releases Trend

The following graph shows the 10-year trend in quantities of TRI chemicals released by facilities in the chemical manufacturing sector.



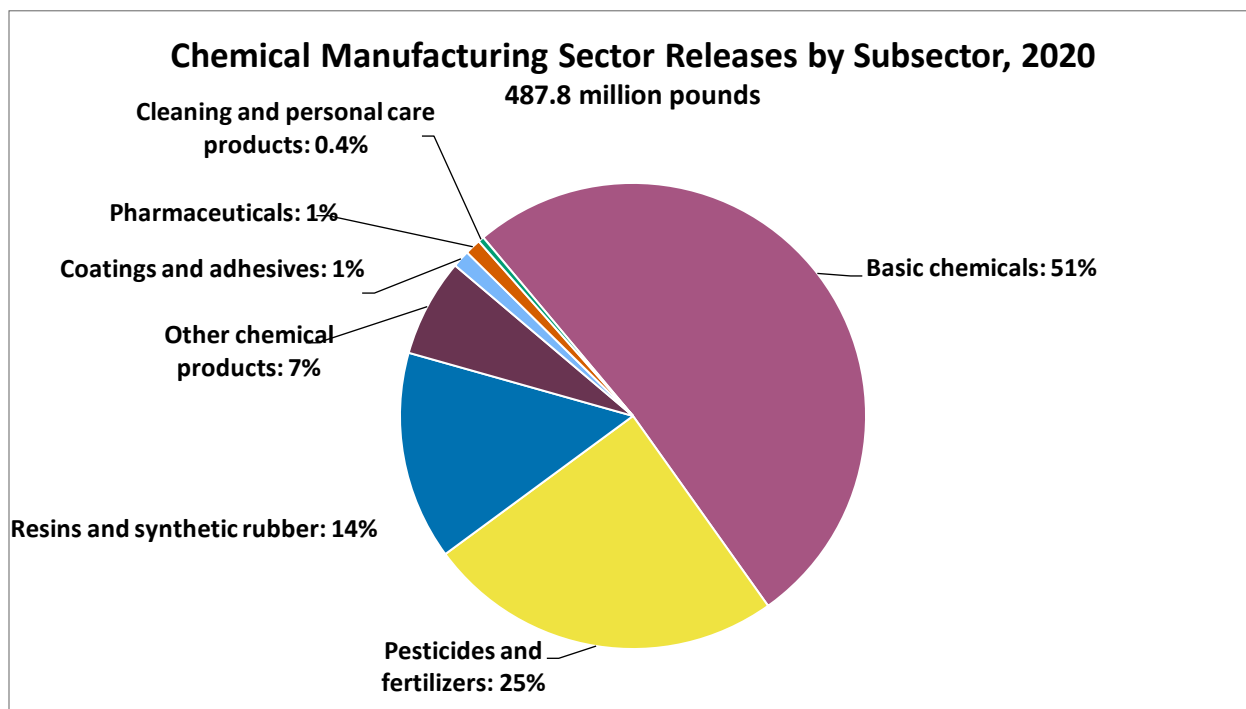
Note: For comparability, trend graphs include only those chemicals that were reportable to TRI for all years presented.

From 2011 to 2020:

- Releases reported by facilities in the chemical manufacturing sector decreased by 2%.
- The proportion of off-site releases increased during this time, while on-site land disposal and on-site water releases now make up a smaller fraction of total releases. Proportions of on-site air releases remained the same.

From 2019 to 2020:

- Releases decreased by 21 million pounds (-4%). This trend is driven by large decreases in land disposal at numerous facilities.
- For 2020, the basic chemicals manufacturing subsector accounted for 51% of chemical manufacturing releases. This subsector includes facilities manufacturing products such as organic and inorganic chemicals, industrial gases, and petrochemicals.



Source Reduction in the Chemical Manufacturing Sector:

Although the chemical manufacturing sector has consistently managed the most production-related waste of any TRI-covered sector, 263 facilities (8% of facilities) in this sector initiated source reduction activities in 2020. The most common types of source reduction activities were Good Operating Practices and Process Modifications. For example:

- An in-vitro diagnostic substance manufacturer purchased new equipment to allow for larger batch sizes, reducing dichloromethane waste. [[Click to view facility details in the TRI P2 Search Tool](#)]
- A polish and other sanitation goods manufacturing facility replaced a dry blender which resulted in more efficient washouts and generation of less wastewater that contains formaldehyde. [[Click to view facility details in the TRI P2 Search Tool](#)]
- Several chemical manufacturing facilities reported source reduction activities that resulted in reducing both TRI chemical wastes and greenhouse gas emissions. For example, one facility replaced boilers to eliminate the use of coal as a fuel for on-site steam generation and reduce releases of dioxin and dioxin-like compounds as well as greenhouse gasses [[Click to view facility details in the TRI P2 Search Tool](#)]. Another facility was able to use styrene/ethylbenzene waste as an alternative fuel source,

reducing the amount of natural gas utilized for the heater [[Click to view facility details in the TRI P2 Search Tool](#)].

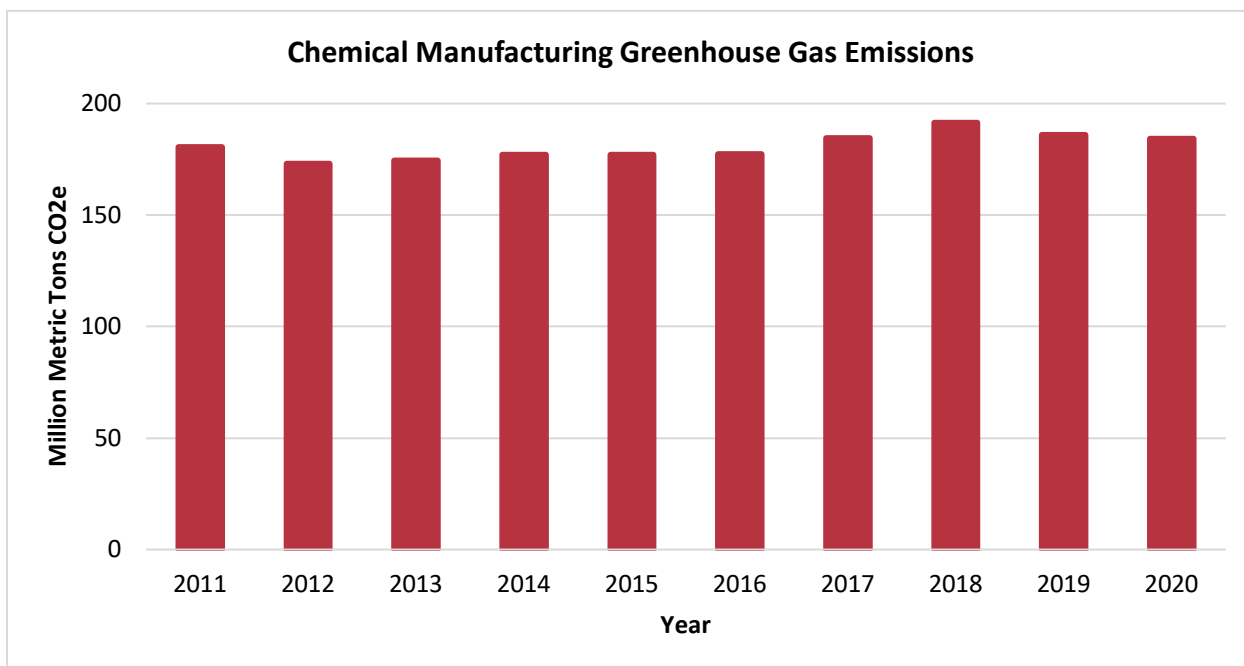
Additional Resources

- To find more examples of chemical manufacturers' source reduction activities and the source reduction barriers they reported, visit [TRI's P2 Search Tool](#).
- [EPA's Smart Sectors Program](#) is partnering with chemical manufacturing trade associations to develop sensible approaches to industrial operations that better protect the environment and public health.
- For more information on how this and other industry sectors can choose safer chemicals, visit EPA's [Safer Choice Program](#).
- EPA supports the adoption of [Green Chemistry](#) practices that reduce the environmental impacts from this sector, including reductions in the use of toxic chemicals, water, and electricity.
- Facilities interested in exploring P2 opportunities or getting technical assistance can contact their regional P2 coordinator. [Find the P2 coordinators for your state and region](#).

Greenhouse Gas Reporting in the Chemical Manufacturing Sector

While many chemical releases are reported to the TRI, the TRI Program does not cover all chemicals released by industry. Notably, most greenhouse gas (GHG) emissions are not reported to the TRI. Greenhouse gas emissions increase the concentration of these gases in the atmosphere, which alter the amount of heat trapped by the Earth's atmosphere and contribute to climate change. These elevated concentrations and their effect on climate are reasonably anticipated to endanger the public health and welfare of current and future generations.

EPA's Greenhouse Gas Reporting Program (GHGRP) tracks facility-level emissions from the largest U.S. sources of GHGs. The chart below shows GHG emissions reported to the GHGRP by facilities in the chemical manufacturing sector from 2011 to 2020.



- Note that while TRI typically collects chemical release data in units of pounds, the GHGRP collects GHG emissions data in units of metric tons of carbon dioxide equivalents (MTCO₂e). This chart shows GHG emissions in MTCO₂e.
- The chemical manufacturing sector reported emissions of over 184 million MTCO₂e for 2020, a 2% increase since 2011.
- For 2020, 3,411 facilities in this sector reported to the TRI and 453 facilities in the sector reported to the GHGRP. Some facilities report to only one of these programs due to different applicability requirements and reporting thresholds; while most facilities in this sector that report to the TRI Program do not report to the GHGRP, most of the facilities in this sector that report to the GHGRP also report to TRI.

What are carbon dioxide equivalents (CO₂e)?

Different GHGs can have different effects on the Earth's warming; Global Warming Potential (GWP) values allow for comparisons of the global warming impacts of different gases. MTCO₂e is a weighted measurement that considers the tonnes of the gases and their associated global warming potentials.

Additional Resources

- To view and explore the data reported to EPA on GHG emissions, see the [Facility Level Information on GreenHouse gases Tool \(FLIGHT\)](#).
- EPA's [Understanding Global Warming Potentials](#) webpage provides further information on GWPs, how they are used, and how they differ by GHG.
- For more details on the chemical manufacturing sector's GHG emissions, visit [GHGRP Chemicals](#).


Cement Manufacturing

This section examines how TRI chemical wastes are managed within the cement manufacturing sector (defined as facilities reporting their primary NAICS code as 327310).

CEMENT MANUFACTURING


What the Sector Does

Facilities in the cement manufacturing sector produce cement, a binding agent that when mixed with water, sand, and gravel or crushed stone forms the rock-like mass known as concrete. Concrete, in turn, is used in highway, commercial, and residential construction projects.




THE SECTOR
EMPLOYS
16,000
 PEOPLE

U.S. Census Annual Survey of Manufactures
2019 data



THE SECTOR
PRODUCES OVER
89 MILLION
 METRIC TONS OF CEMENT

U.S. Geological Survey 2020 data

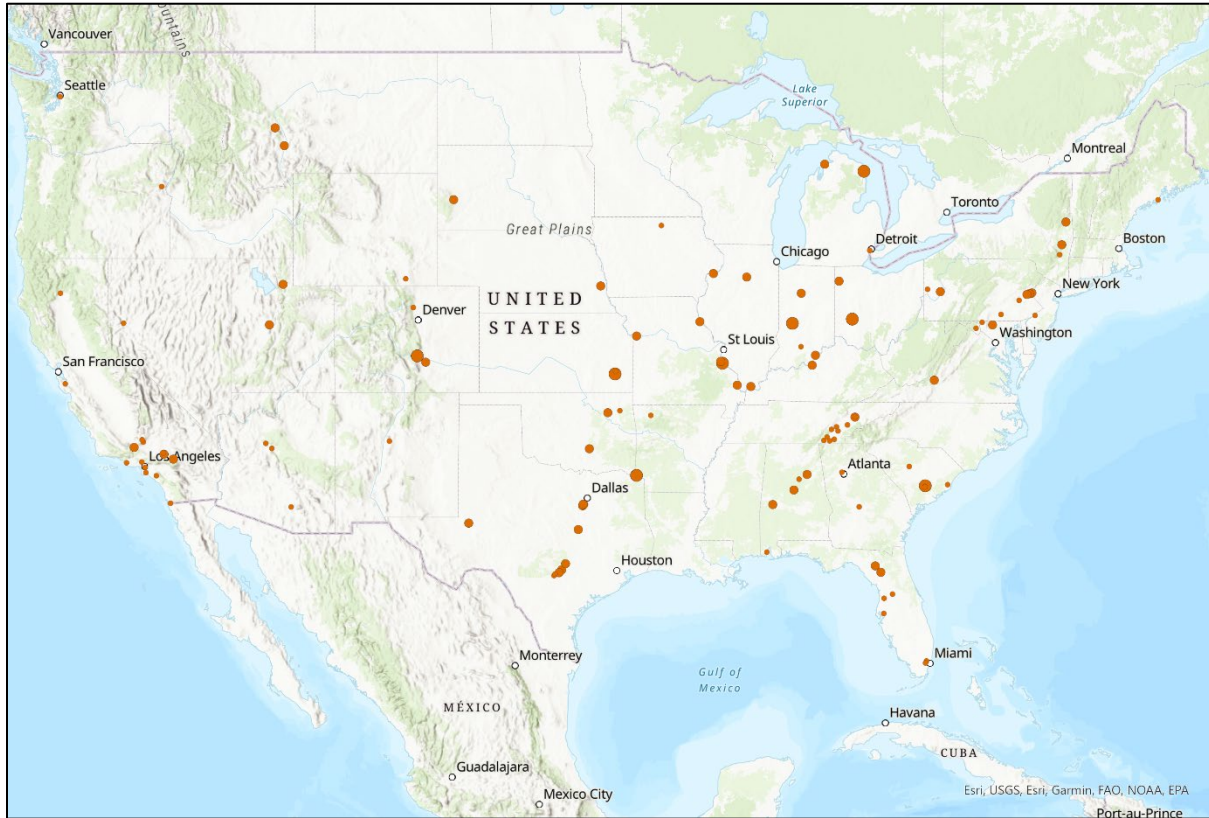


113 facilities in the sector report to TRI

U.S. EPA TRI, Reporting Year 2020

Although relatively few facilities in the cement manufacturing sector report to TRI, the operations of these facilities result in substantial quantities of TRI waste managed and released, as well as being a notable contributor to the country's greenhouse gas emissions. The cement manufacturing sector is unique among TRI sectors because of its high volume of waste combusted for energy recovery. Cement manufacturers often use waste from other facilities, such as spent solvents, as fuel to produce heat needed for the manufacture of cement.

This map shows the locations of the cement manufacturing facilities that reported to TRI for 2020, sized by their relative releases. Click on a facility for details on its TRI reporting.



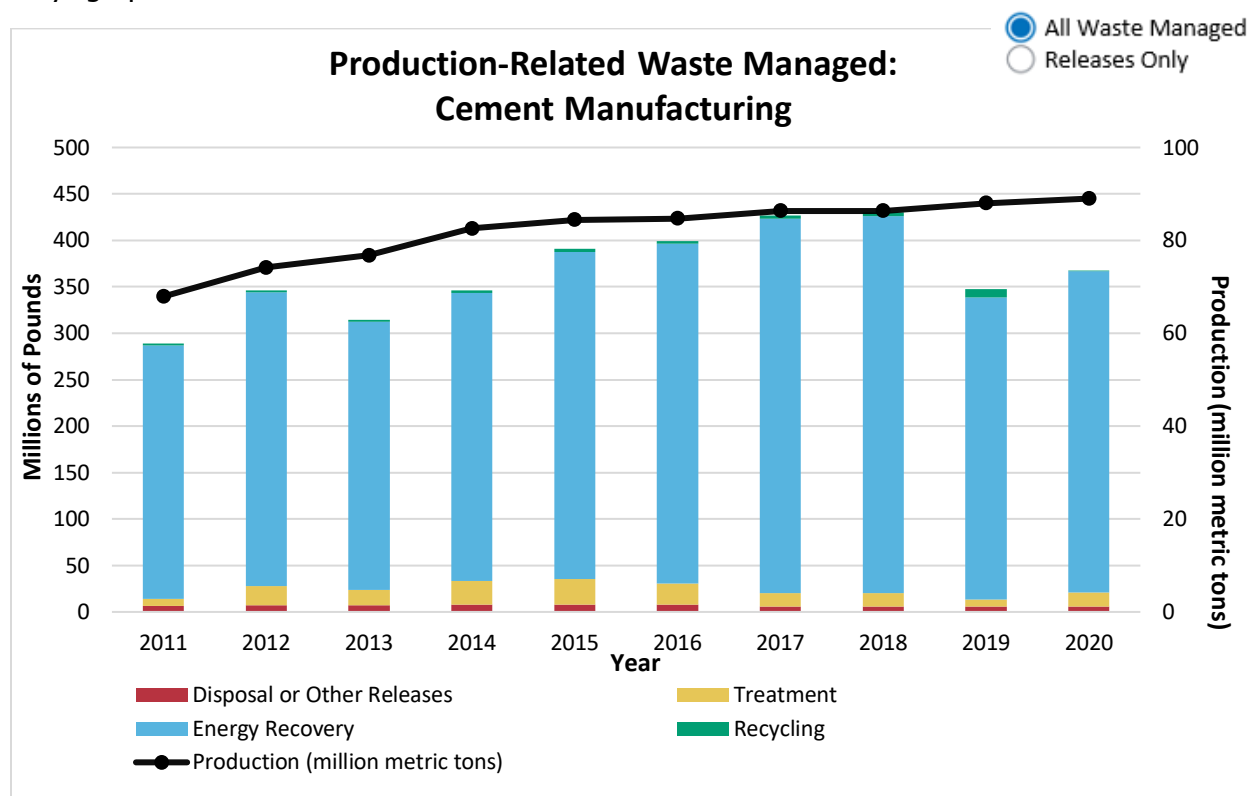
Cement Manufacturing Facilities Reporting to TRI, 2020

[View Larger Map](#)

For 2020, 113 facilities in the cement manufacturing sector reported to TRI. Cement manufacturing is an energy-intensive process in which limestone and other ingredients are heated in a kiln. To maintain the high temperatures required to produce cement, facilities use a variety of fuels, including chemical wastes. This sector manages a greater portion of its chemical waste by burning it for energy recovery than any other TRI-covered sector.

Cement Manufacturing Waste Management Trend

The following graph shows the 10-year trend in quantities of TRI chemical waste managed through recycling, energy recovery, treatment, and disposal or other releases by facilities in the cement manufacturing sector. For more details on quantities released, toggle to the “Releases only” graph.



Note: For comparability, trend graphs include only those chemicals that were reportable to TRI for all years presented.

From 2011 to 2020:

- Quantities of production-related waste managed by the cement manufacturing sector have fluctuated since 2011, while production (represented by the black line as reported by the [U.S. Geological Survey](https://www.usgs.gov/)) increased by 31%.
- More than 92% of this sector’s waste is managed through energy recovery; this is a higher proportion of waste managed through energy recovery than any other sector. Since 2011, quantities of TRI chemical waste managed through recycling and disposal or other releases decreased, while quantities of waste managed through energy recovery and treatment increased.

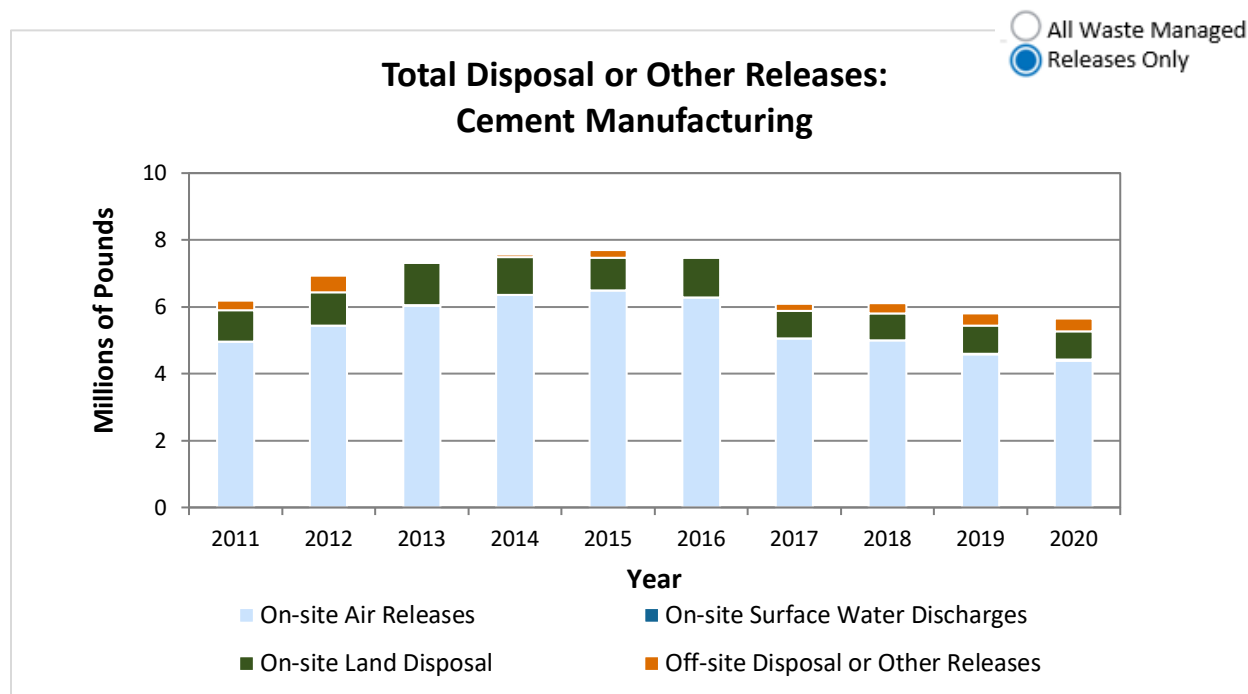
- US cement production increased by 3% from 2018 to 2020, but production-related waste managed decreased by 15% during the same period.
 - Facilities in this sector frequently combust wastes from other facilities to make use of the wastes' heating value. This is considered preferable to disposing of that waste. Decreased waste management in this sector may be due operational changes, such as replacing fuel containing TRI-reportable chemicals with other fuels that contain lower levels of TRI chemicals.

From 2019 to 2020:

- Total production-related waste managed at cement manufacturing facilities increased by 19 million pounds (6%), driven by increases in energy recovery and treatment. Meanwhile, cement production levels increased by 1%.

Cement Manufacturing Releases Trend

The following graph shows the annual quantities of TRI chemicals released by facilities in the cement manufacturing industry.



Note: For comparability, trend graphs include only those chemicals that were reportable to TRI for all years presented.

From 2011 to 2020:

- Since 2011, TRI chemical releases by the cement manufacturing sector have fluctuated, with an overall decrease of 548,000 pounds (-9%).
 - Air releases decreased by 571,000 pounds (-12%). On-site land disposal decreased by 92,000 pounds (10%) and off-site disposal increased by 90,000 pounds (31%). Releases to water made up less than 1% of the sector’s releases.
 - Releases increased between 2011 and 2015 but have decreased by 27% since 2015, driven by several facilities that reported large reductions in air releases.

From 2019 to 2020:

- Releases decreased by 172,000 pounds (3%).
- In 2020, releases to air accounted for 78% of all releases reported by the cement manufacturing sector.

Source Reduction in the Cement Manufacturing Sector:

Since 2011, 15 facilities have reported source reduction activities, including a facility that switched to a new clay material which contained less mercury. [\[Click to view facility details in the TRI P2 Search Tool\]](#). To find other examples of the sector's source reduction activities and the source reduction barriers they face, visit [TRI's P2 Search Tool](#).

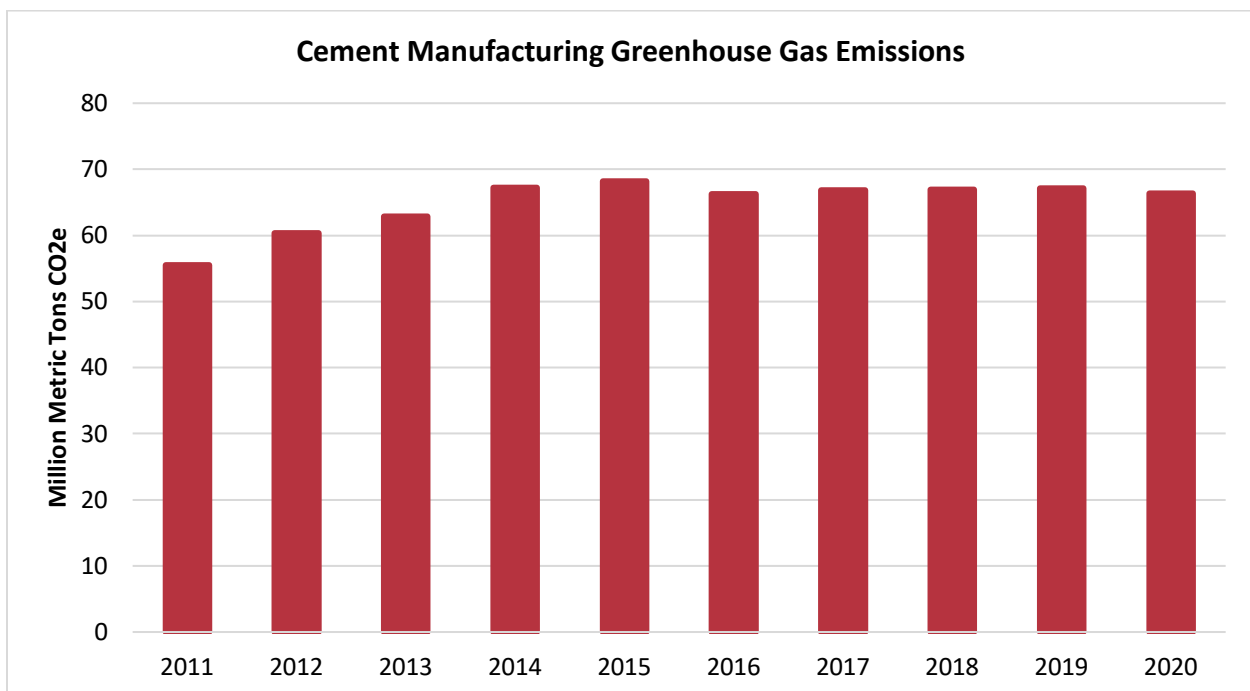
Additional Resources

- [EPA's Smart Sectors Program](#) is partnering with cement and concrete manufacturing trade associations to develop sensible approaches to industrial operations that better protect the environment and public health.
- See the [USGS Cement Statistics and Information webpage](#) for annual reports on the worldwide supply of and demand for cement.

Greenhouse Gas Reporting in the Cement Manufacturing Sector:

While many chemical releases are reported to the TRI, the TRI Program does not cover all chemicals released by industry. Notably, most greenhouse gas (GHG) emissions are not reported to the TRI. Greenhouse gas emissions increase the concentration of these gases in the atmosphere, which alter the amount of heat trapped by the Earth's atmosphere and contribute to climate change. These elevated concentrations and their effect on climate are reasonably anticipated to endanger the public health and welfare of current and future generations.

EPA's Greenhouse Gas Reporting Program (GHGRP) tracks facility-level emissions from the largest U.S. sources of GHGs. The chart below shows GHG emissions reported to the GHGRP by facilities in the cement manufacturing sector from 2011 to 2020.



- Note that while TRI typically collects chemical release quantities in units of pounds, the GHGRP collects GHG emissions data expressed in units of metric tons of carbon dioxide equivalents (MTCO_{2e}). This chart shows GHG releases in MTCO_{2e}.
- The cement manufacturing sector reported emissions of over 66 million MTCO_{2e} for 2020, an increase of 20% since 2011.
- Although 113 facilities in this sector reported to the TRI for 2020, 92 reported to the GHGRP under the cement production sector in 2020. Some facilities report to only one of these two programs due to different regulatory requirements between the programs.

What are carbon dioxide equivalents (CO_{2e})?

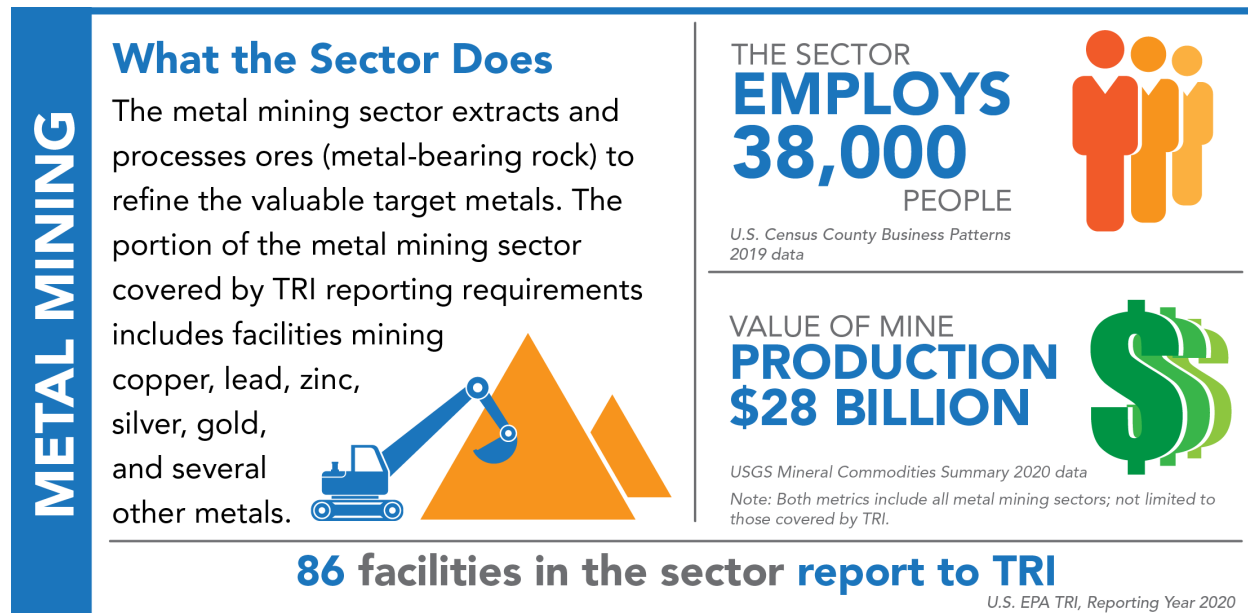
Different GHGs can have different effects on the Earth's warming; Global Warming Potential (GWP) values allow for comparisons of the global warming impacts of different gases. MTCO_{2e} is a weighted measurement that considers the tonnes of the gases and their associated global warming potentials.

Additional Resources

- To view and explore the data reported to EPA on GHG emissions, see the [Facility Level Information on GreenHouse gases Tool \(FLIGHT\)](#)
- EPA's [Understanding Global Warming Potentials](#) webpage provides further information on GWPs, how they are used, and how they differ by GHG.
- For more details on the cement manufacturing sector's GHG emissions, visit [GHGRP Minerals](#).

Metal Mining

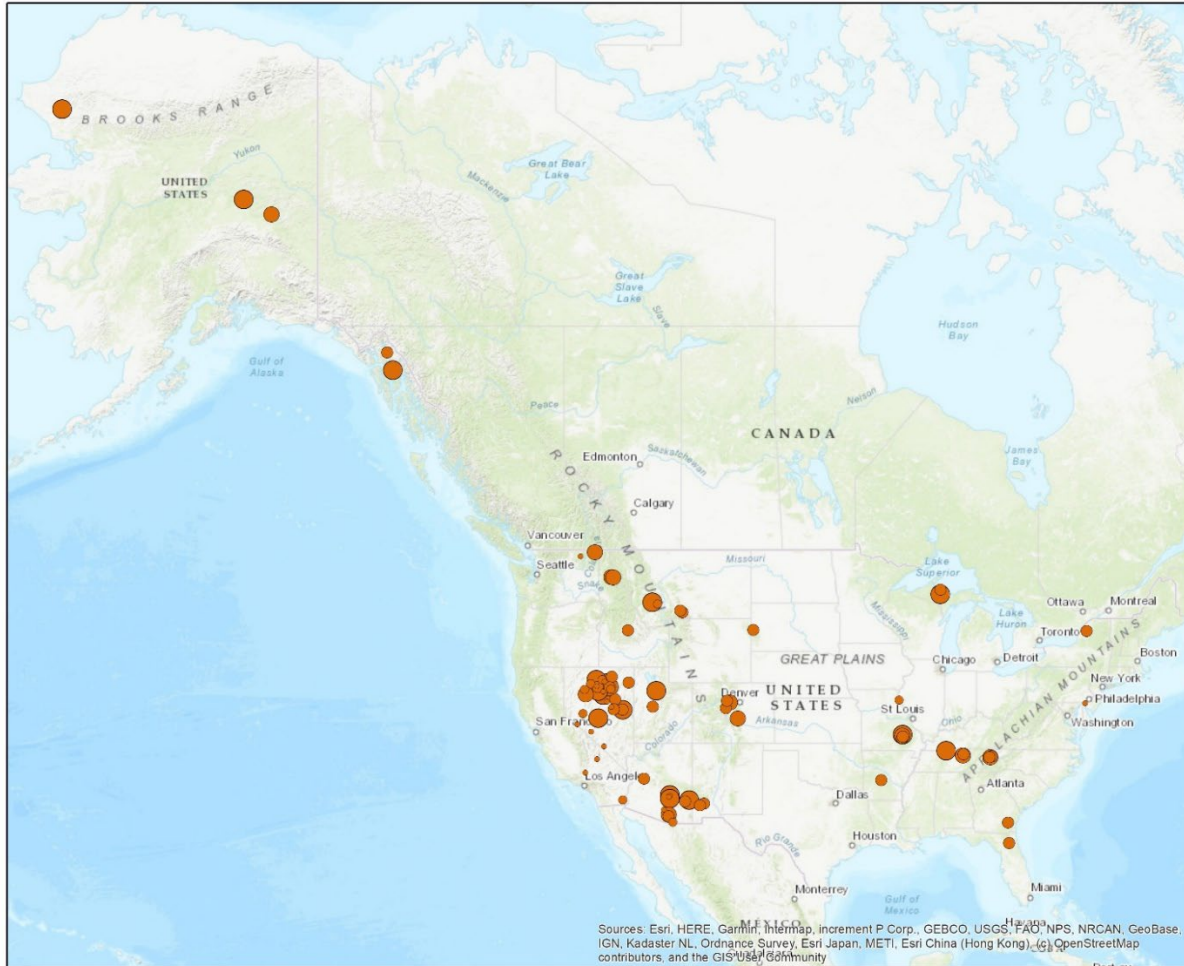
This section examines how TRI chemical wastes are managed by facilities in the metal mining sector (defined as facilities reporting their primary NAICS code as 2122).



Although the number of metal mines reporting to TRI makes up only a small portion of the total number of facilities that report to TRI, the sector accounted for 45% of all releases reported to TRI for 2020.

This map shows the locations of the metal mining facilities that reported to TRI for 2020, sized by their relative releases. Click on a facility for details on its TRI reporting.

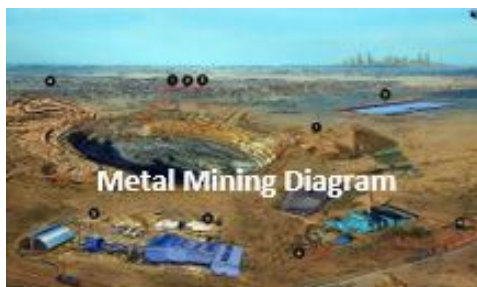
Note: Mines are shown on this map based on their longitude/latitude, which may be miles from the city identified on the mine's TRI reporting forms. Mines can qualify their location relative to the city by noting the distance in the street address data field of their TRI reporting forms.



Metal Mines Reporting to TRI, 2020

[View Larger Map](#)

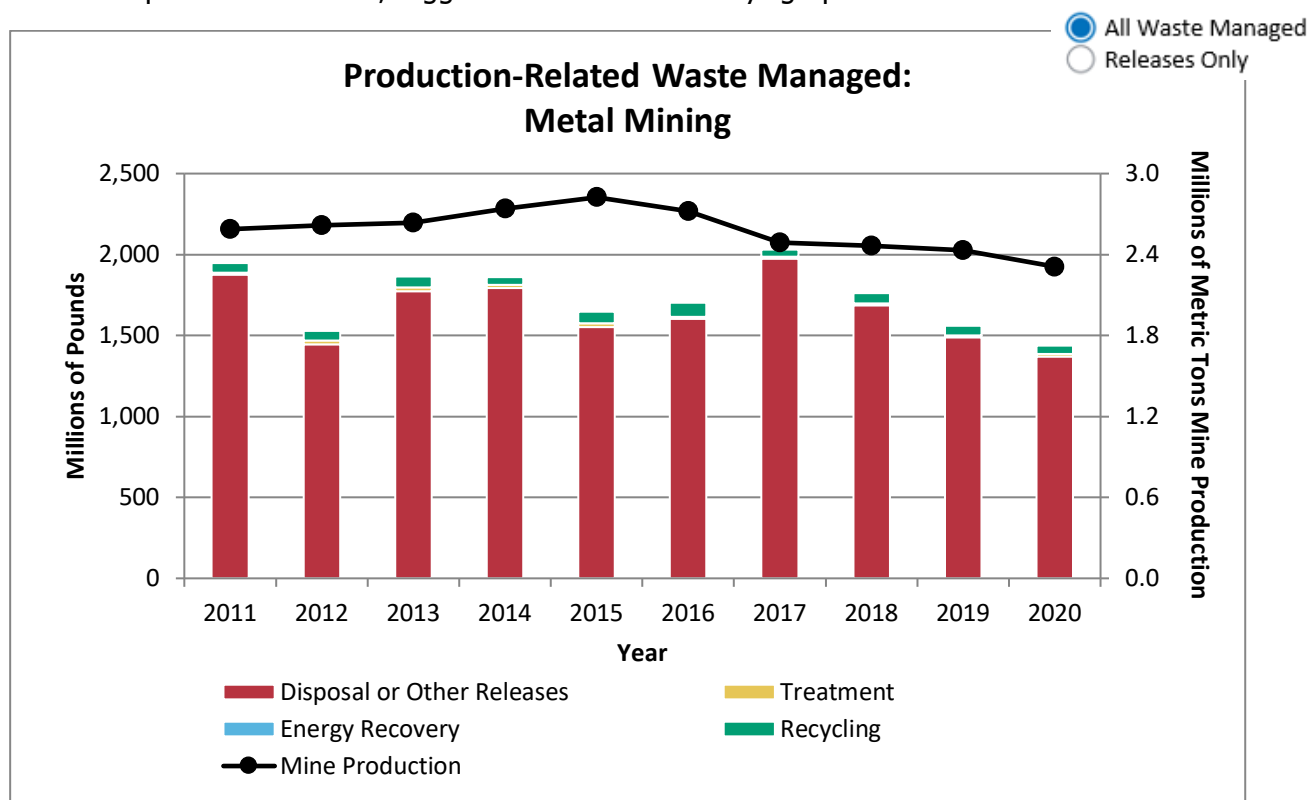
For 2020, 86 metal mining facilities reported to the TRI. They tend to be in western states where most of the copper, silver, and gold mining occurs; however, zinc and lead mining tend to occur in Missouri and Tennessee. U.S. mining operations generate metals that are used in a



wide range of products, including automobiles, electric and industrial equipment, jewelry, and decorative objects. The extraction and processing of these minerals generate large amounts of on-site land disposal, primarily of metal-bearing rock (called ore) and waste rock. To learn more about metal mining operations and their TRI reporting, [explore the interactive metal mining diagram](#).

Metal Mining Waste Management Trend

The following graph shows the annual quantities of TRI chemical waste managed by the metal mining industry from 2011 to 2020, mainly in the form of on-site land disposal. The nature of metal mining operations limits the feasibility of other methods of waste management. For more details on quantities released, toggle to the “Releases only” graph.



Note: For comparability, trend graphs include only those chemicals that were reportable to TRI for all years presented.

From 2011 to 2020:

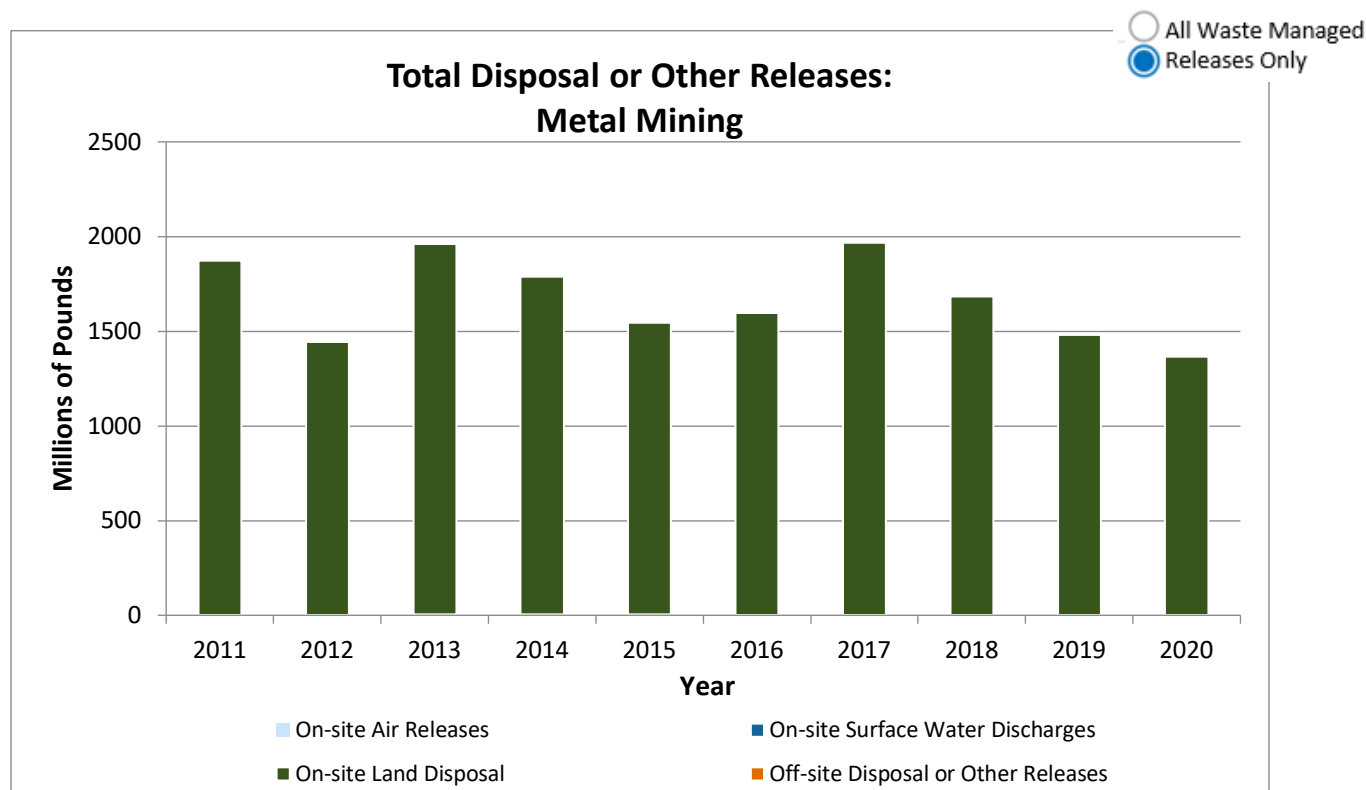
- The quantity of waste managed by the metal mining sector fluctuated year to year and does not closely follow the sector’s production (as reported in the [United States Geological Survey](#)).
- One factor commonly cited by facilities as a contributor to the changes in quantities of waste managed is the chemical composition of the extracted ore, which can vary substantially from year to year. In some cases, small changes in the ore’s composition can impact whether TRI chemicals in ore qualify for a concentration-based TRI reporting exemption in one year but not in the next year or vice versa.

From 2019 to 2020:

- The quantity of TRI chemical waste managed by this sector decreased by 126 million pounds (-8%).
- During 2020, 95% of the metal mining sector's production-related waste generated was disposed of or otherwise released. Most of this waste consisted of metals, which were primarily disposed of to land on site at the mine.

Metal Mining Releases Trend

The following graph shows the 10-year trend in quantities of TRI chemicals released by the metal mining industry, primarily through on-site land disposal.



Note: For comparability, trend graphs include only those chemicals that were reportable to TRI for all years presented.

From 2011 to 2020:

- More than 99% of the metal mining sector’s releases of TRI chemicals were on site and to land. Quantities of on-site land disposal by metal mines have fluctuated from year to year.
 - Optionally, facilities can indicate whether reported land releases represent disposal of waste rock. For 2020, at least 44% of the on-site land disposal of TRI chemicals at metal mines was in the form of waste rock.
- The quantity of TRI chemicals released alone is not an indicator of health risks posed by the chemicals, as described in the [Hazard and Potential Risk of TRI Chemicals](#) section. For more information, see the TRI document, [Factors to Consider When Using Toxics Release Inventory Data](#).

In 2020:

- Among the sectors reporting to TRI, the metal mining sector reported the largest quantity of waste disposed of or otherwise released, accounting for 45% of total TRI releases and 70% of on-site land disposal for all industries.

Source Reduction in the Metal Mining Sector:

Unlike manufacturing, the nature of mining—the necessary movement and disposal of large volumes of rock to access the target ore—does not lend itself to source reduction. To find examples of metal mining source reduction activities and the source reduction barriers mining facilities face, visit the [TRI P2 Search Tool](#).

[EPA's Smart Sectors Program](#) is partnering with the mining sector to develop sensible approaches to better protect the environment and public health.

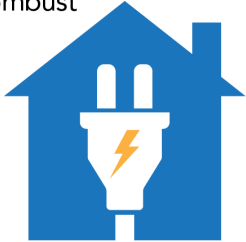
Electric Utilities

This section examines how TRI chemical wastes are managed in the electric utilities sector (defined as facilities reporting their primary NAICS code as 2211).


ELECTRIC UTILITIES

What the Sector Does

Electric utilities generate, transmit, and distribute electric power. Electric-generating facilities use a variety of fuels to generate electricity; however, only those electricity generating facilities that combust coal or oil to generate power for distribution in commerce are subject to TRI reporting requirements.




THE SECTOR
EMPLOYS
503,000
 PEOPLE



U.S. Census County Business Patterns 2019 data. Includes all fuel types for electricity generation; not limited to those fuels covered by TRI

THE SECTOR
GENERATES
596 MILLION
 MWH

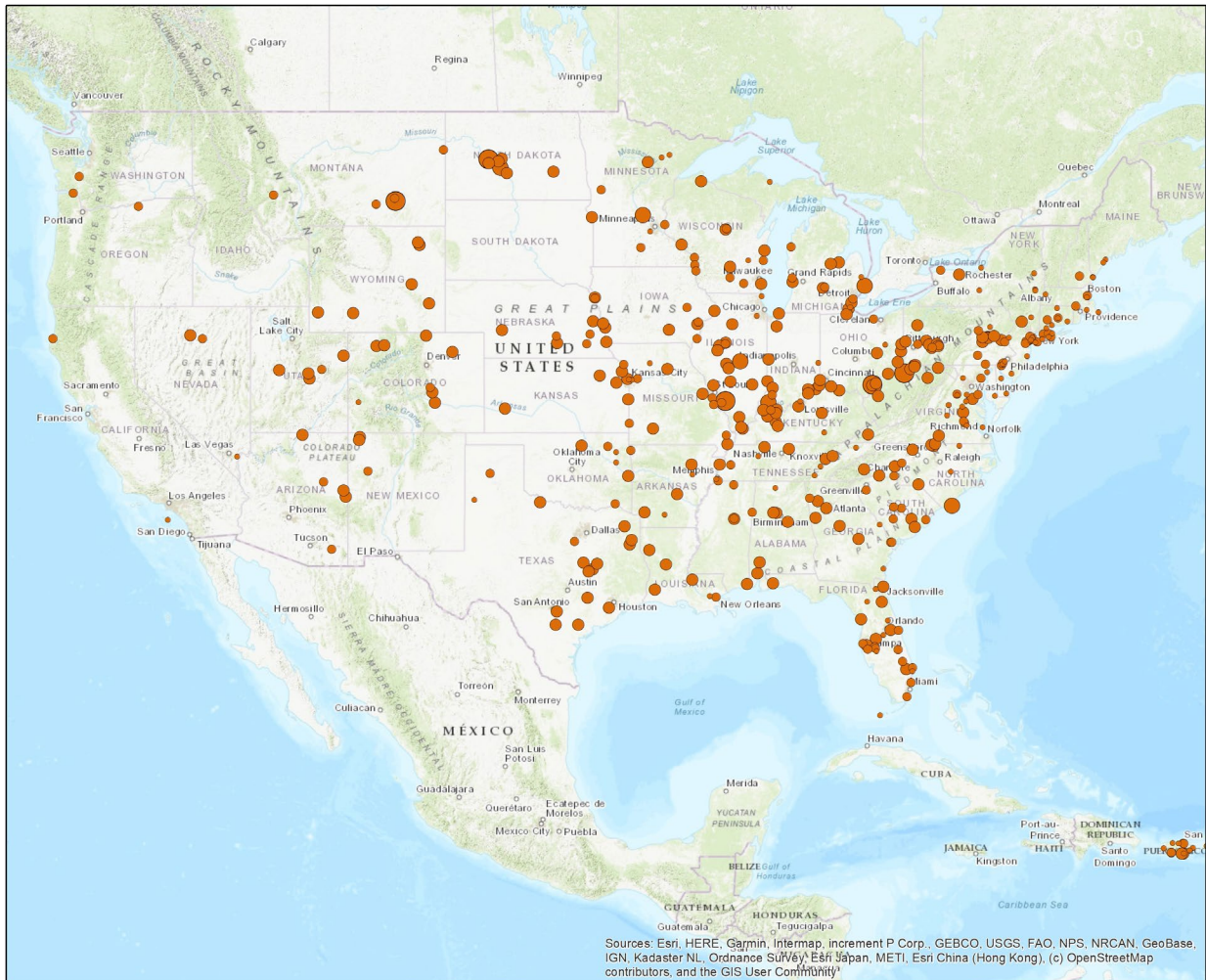


U.S. Department of Energy 2020 data by electric utilities that combust coal or oil for electricity generation

408 facilities in the sector report to TRI

U.S. EPA TRI, Reporting Year 2020

This map shows the locations of the electric utilities that reported to TRI for 2020, sized by their relative releases. Click on a facility for details on its TRI reporting.



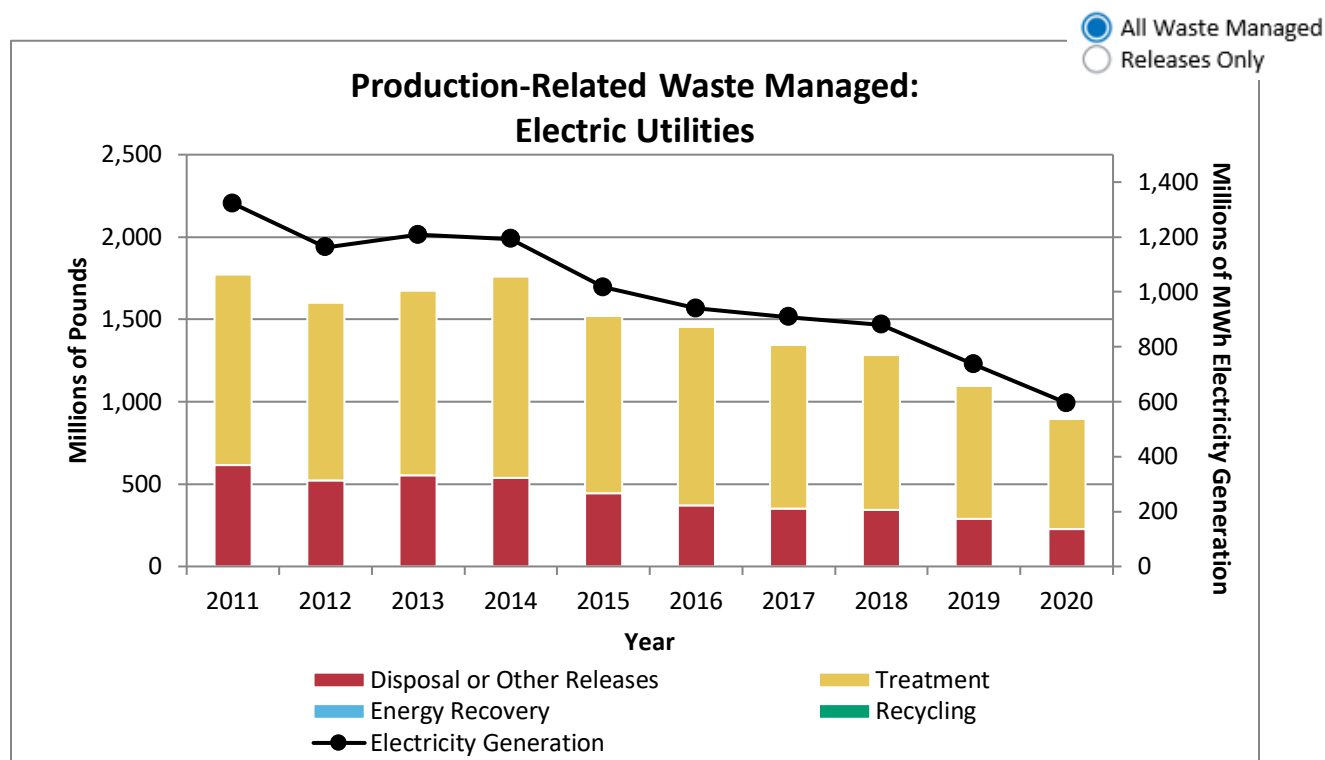
Electric Utilities Reporting to TRI, 2020

[View Larger Map](#)

For 2020, 408 electricity generating facilities reported to TRI. Facilities in the sector use different fuels to produce electricity, but only those that combust coal or oil to generate electricity for distribution in commerce are subject to TRI reporting requirements.

Electric Utilities Waste Management Trend

The following graph shows the 10-year trend in quantities of TRI chemical waste that electric utility facilities managed, primarily through treatment or release. For more details on quantities released, toggle to the "Releases only" graph.



Note: For comparability, trend graphs include only those chemicals that were reportable to TRI for all years presented.

From 2011 to 2020:

- Quantities of waste managed decreased by 888 million pounds (-50%) since 2011, driven by reduced releases.
- Net electricity generation by electric utilities from coal and oil fuels decreased by 55% (as reported by the [U.S. Department of Energy's Energy Information Administration](#)). Note that only facilities that combust coal or oil to generate electricity are covered under TRI reporting requirements.
 - Data from the Energy Information Administration indicate that the mix of energy sources for U.S. electricity generation has changed over time. Natural gas and renewable energy sources account for an increasing share of U.S. electricity generation, while coal-fired electricity generation has declined. Use of oil for

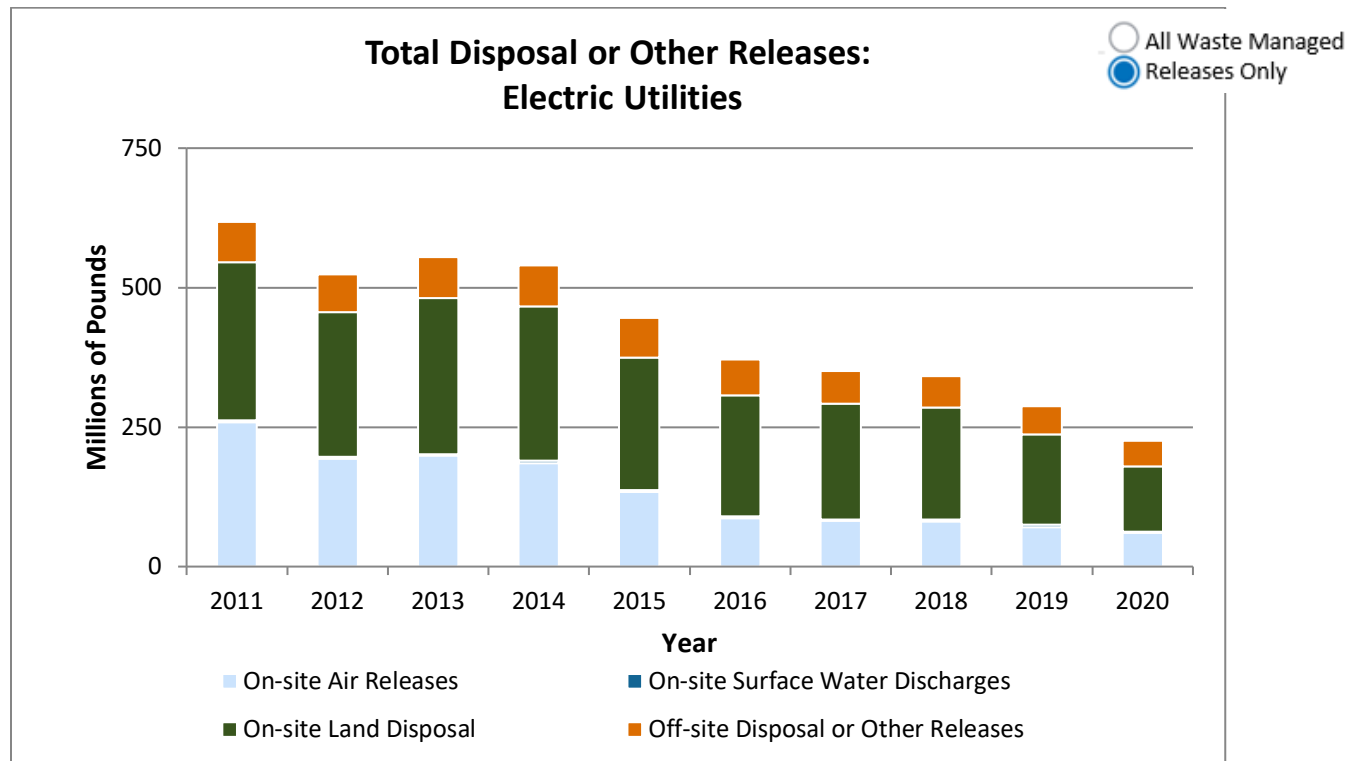
electric power generation continues to contribute a small percentage of total U.S. electricity generation.

In 2020:

- Nearly three-quarters of the sector's production-related waste generated was treated, while approximately one-quarter was released to the environment.
 - This contrasts with 2011, when over one-third of the waste from this sector was released into the environment. This trend is due in part to increased installation of air pollution control devices that destroy TRI-reportable chemicals.

Electric Utilities Releases Trend

The following graph shows the annual quantities of TRI chemicals released by electric utilities.



Note: For comparability, trend graphs include only those chemicals that were reportable to TRI for all years presented.

From 2011 to 2020:

- Releases from the electric utilities sector decreased by 392 million pounds (-63%). This decrease was driven by a 199-million pound (-77%) decrease in air releases and a 166-million pound (-58%) decrease in on-site land disposal. Surface water discharges and off-site disposal also decreased, but to a lesser extent.

From 2019 to 2020:

- Releases by electric utilities decreased by 62 million pounds (-22%), driven by reductions in on-site land disposal of barium compounds and reduced air releases of sulfuric acid and hydrochloric acid.

Source Reduction in the Electric Utilities Sector:

In the electric utilities sector, 7 facilities (2% of the electric utility facilities reporting to TRI) initiated source reduction activities in 2020 to reduce their use of TRI chemicals and creation of wastes containing TRI chemicals. Some facilities reported process improvements to increase their efficiency, which may lead to reduced greenhouse gas emissions as well as reduced TRI chemical wastes.

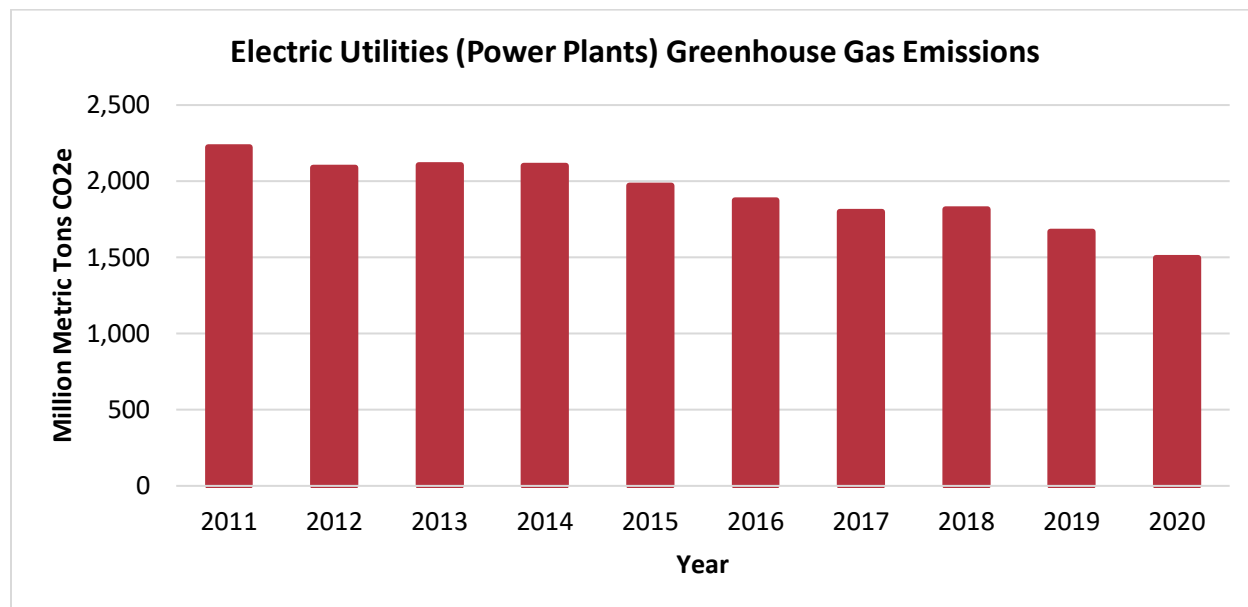
To find more examples of electric utilities' source reduction activities and the source reduction barriers they face, visit [TRI's P2 Search Tool](#).

[EPA's Smart Sectors Program](#) is partnering with this sector to develop sensible approaches to industrial operations that better protect the environment and public health.

Greenhouse Gas Reporting in the Electric Utilities Sector

While many chemical releases are reported to the TRI, the TRI Program does not cover all chemicals released by industry. Notably, most greenhouse gas (GHG) emissions are not reported to the TRI. Greenhouse gas emissions increase the concentration of these gases in the atmosphere, which alter the amount of heat trapped by the Earth's atmosphere and contribute to climate change. These elevated concentrations and their effect on climate are reasonably anticipated to endanger the public health and welfare of current and future generations.

EPA's Greenhouse Gas Reporting Program (GHGRP) tracks facility-level emissions from the largest U.S. sources of GHGs. Under the GHGRP, the Power Plants Sector consists predominantly of facilities that produce electricity by combusting fossil fuels, such as coal, oil, and natural gas, or biomass. The sector also includes facilities that produce steam, heated air, or cooled air by combusting fuels. The chart below shows GHG emissions reported to the GHGRP by facilities in the Power Plants sector from 2011 to 2020.



- Note that while TRI typically collects chemical release data in units of pounds, the GHGRP collects GHG emissions expressed in quantities expressed as metric tons of carbon dioxide equivalents (MTCO₂e). This chart shows GHG emissions in MTCO₂e.
- Total reported emissions from the sector were 1,494.9 million MTCO₂e in 2020, which represented nearly 58% of total direct emissions reported to the GHGRP.
- From 2011 to 2020, GHG emissions from this sector have decreased by 33%. According to data from the [U.S. Department of Energy's Energy Information Administration](#), increased utilization of renewables such as wind and solar and a corresponding decrease in the use of coal from 2011 to 2020 continues to contribute to decreased emissions from this sector across the time series.
- Although 408 facilities in this sector reported to TRI, 1,339 facilities in the Power Plants Sector submitted GHG reports in 2020. Some facilities report to only one of these programs due to different applicability requirements. In particular, TRI covers only electric utilities that combust fuel or oil to generate electricity (i.e., natural gas power plants are not covered by TRI) while the GHGRP covers all power plants that meet the applicability requirements, including natural gas-fueled power plants.

What are carbon dioxide equivalents (CO₂e)?

Different GHGs can have different effects on the Earth's warming; Global Warming Potential (GWP) values allow for comparisons of the global warming impacts of different gases. MTCO₂e is a weighted measurement that considers the tonnes of the gases and their associated global warming potentials.

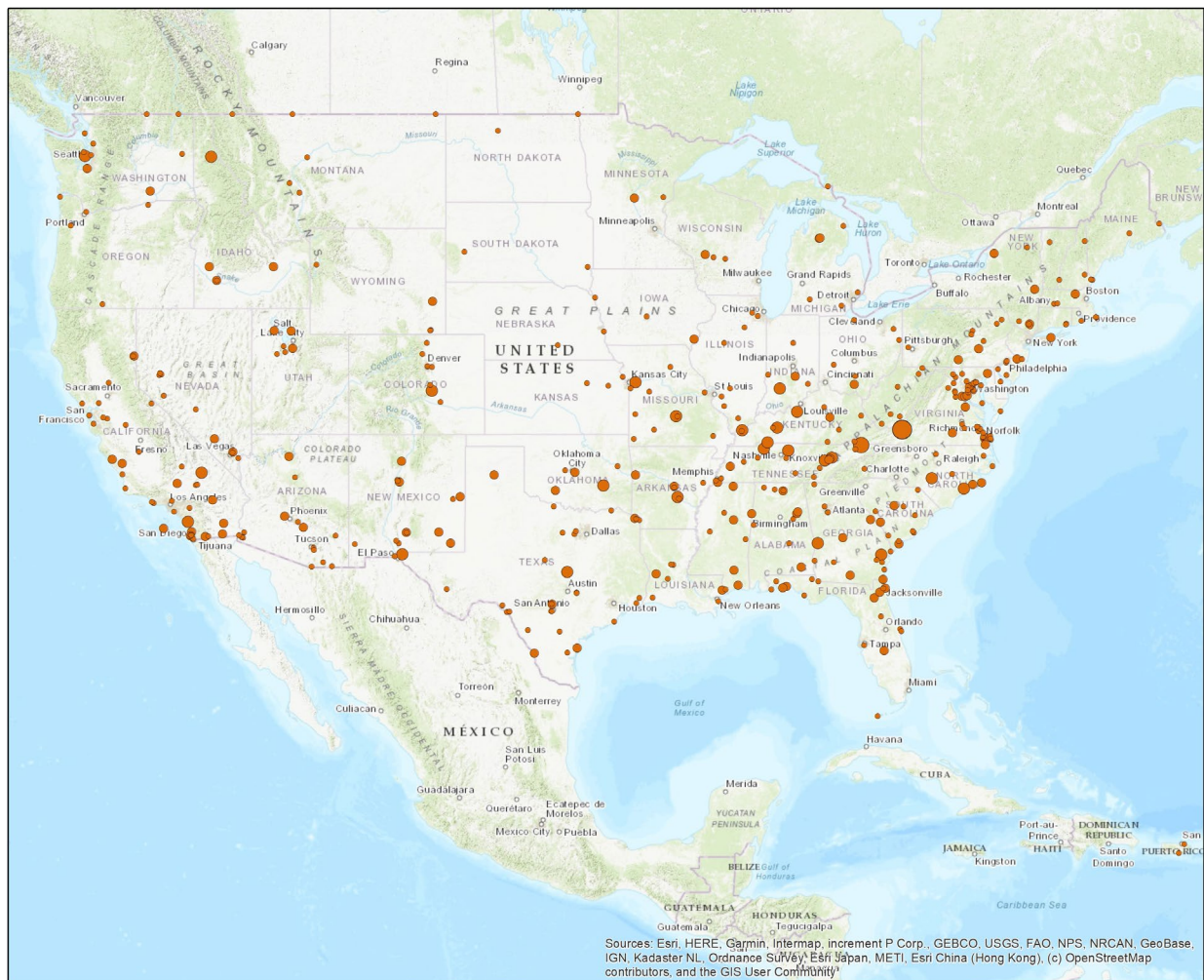
Additional Resources

- To view and explore the data reported to EPA on GHG emissions, see the [Facility Level Information on GreenHouse gases Tool \(FLIGHT\)](#)
- EPA's [Understanding Global Warming Potentials](#) webpage provides further information on GWPs, how they are used, and how they differ by GHG.
- For more details on the cement manufacturing sector's GHG emissions, visit [GHGRP Power Plants](#).

Federal Facilities

All federal facilities, including facilities operated by the EPA, the Department of Defense, and the Department of the Treasury, are subject to TRI reporting requirements, regardless of the type of operations at the facility (as described by its NAICS code).

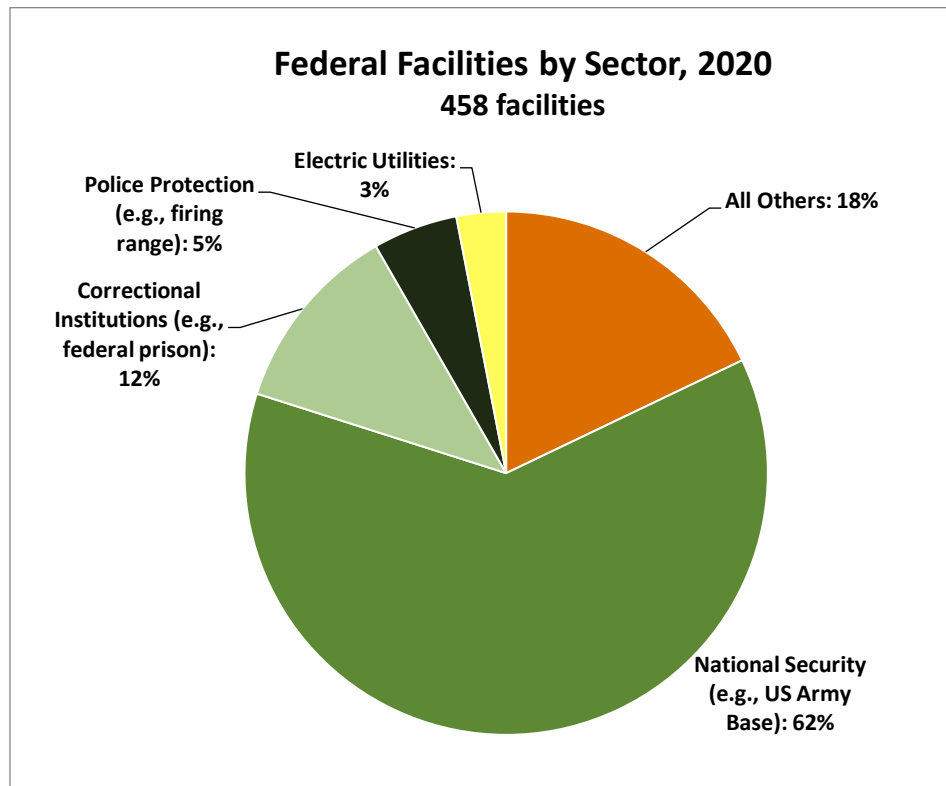
This map shows the locations of 458 federal facilities that reported to TRI for 2020, sized by their relative releases. Click on a facility for details on its TRI reporting.



Federal Facilities Reporting to TRI, 2020
[View Larger Map](#)

Federal Facilities by Industry

The following chart shows the number of federal facilities reporting to TRI by sector for 2020.

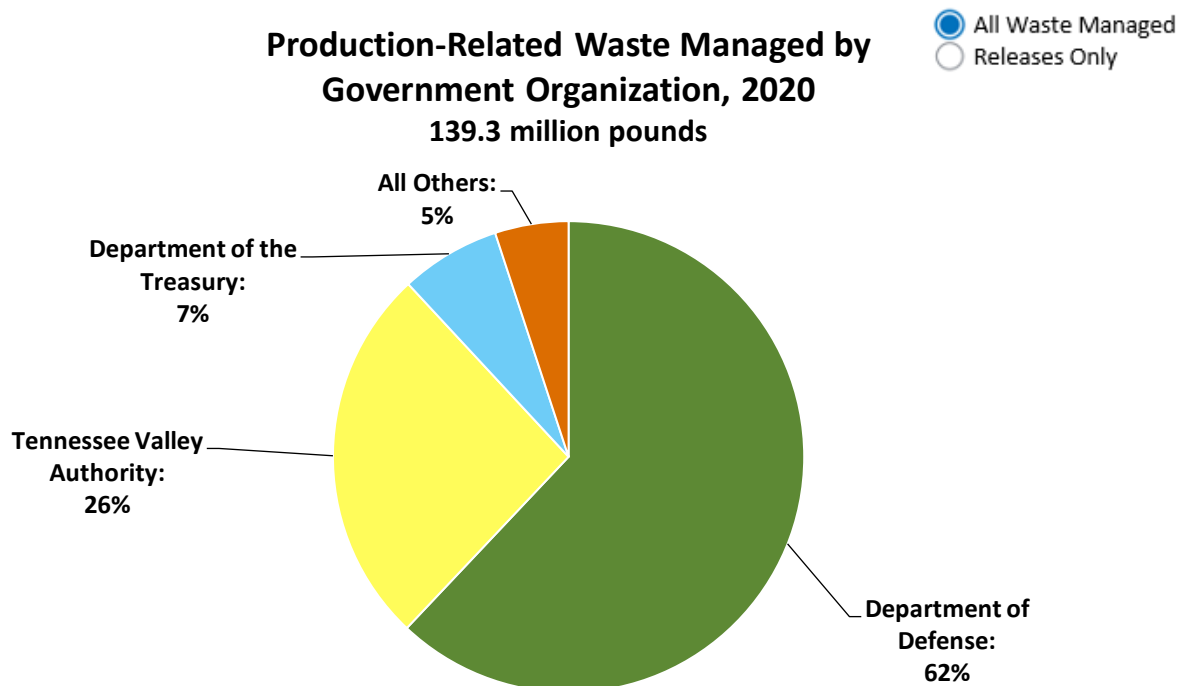


For 2020, 458 federal facilities in 38 different types of operations (based on their 6-digit NAICS codes) reported to TRI. Almost two-thirds of these facilities were in the National Security sector, which includes Department of Defense facilities such as Army and Air Force bases. Since all federal facilities are subject to TRI reporting requirements regardless of industry sector, for some sectors, the TRI database only includes data from federal facilities. Most federal facilities are in such sectors, including military bases; correctional institutions; and police protection, such as training sites for border patrol stations.

As with non-federal facilities, the type of activities occurring at federal facilities determines the amount of chemical waste managed and the management methods used. Some activities occurring at federal facilities are similar to those at non-federal facilities, such as electricity production. In other cases, federal facilities may report waste managed from specialized activities. For example, the federal facilities included under police protection and correctional institutions almost exclusively reported for lead and lead compounds, likely due to the use of lead ammunition on their firing ranges.

Waste Management by Federal Facilities

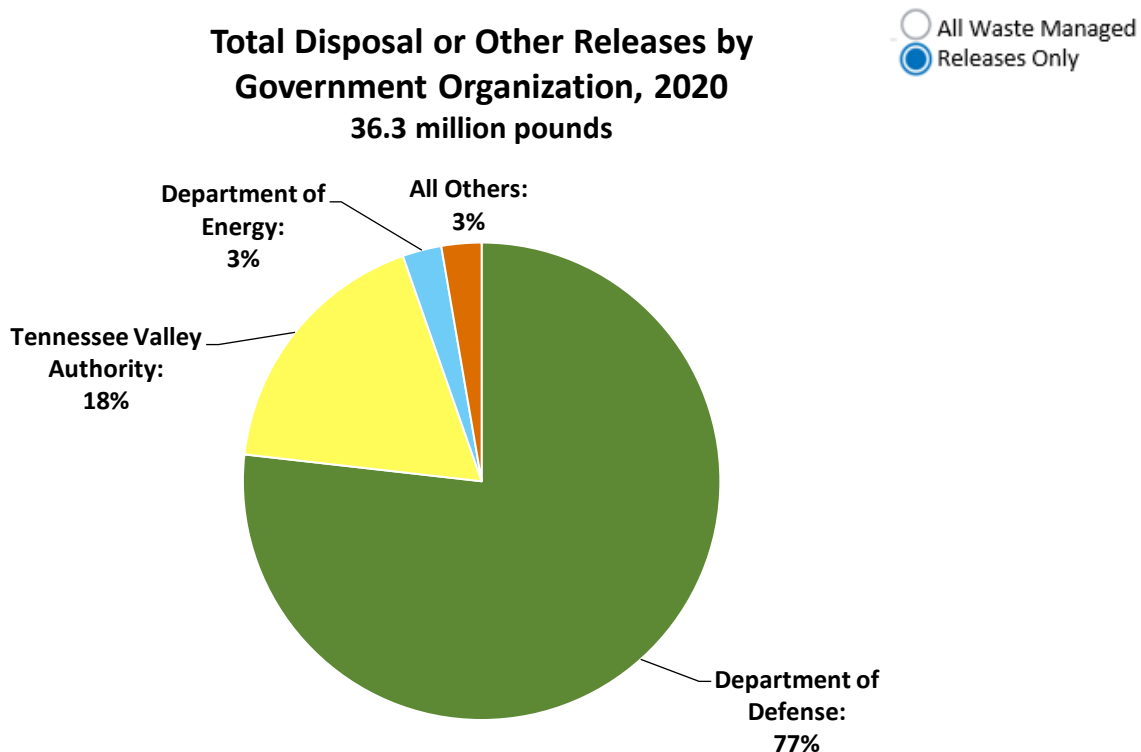
The following pie chart shows the percentages of TRI chemical waste managed through recycling, energy recovery, treatment, and disposal or other releases by federal government organizations in 2020. For more details on quantities released, toggle to the “Releases only” graph.



- The types of waste reported by federal facilities vary by the type of operation. For example:
 - The Tennessee Valley Authority, a government-owned electric utility, provides power to southeastern states. 85% of its reported waste was hydrochloric and sulfuric acid aerosols, which were mostly treated on site.
 - The Department of the Treasury facilities reporting to TRI are mints for manufacturing currency and, accordingly, they report metals (e.g., copper and nickel) to TRI. Almost all of their metal waste was recycled off site.

Releases by Federal Facilities

The following graph shows the percentages of TRI chemicals released by federal government organizations in 2020.



- Most of the Department of Defense’s releases were on-site releases of nitrate compounds to water and on-site land disposal of metals and metal compounds.
- The chemicals released by the Tennessee Valley Authority are similar to the chemicals released by other [electric utilities](#) that report to TRI. On-site land disposal of barium compounds and air releases of sulfuric acid make up a large portion of releases from the Tennessee Valley Authority and other electric utilities.

Source Reduction at Federal Facilities:

Federal facilities’ operations are diverse and few focus on manufacturing processes. Due to this variety of functions, operations at some federal facilities are better suited to source reduction strategies than others. For the 2020 reporting year, 21 federal facilities (5%) reported implementing source reduction activities.



Federal facilities have often reported difficulties when trying to reduce their use of lead because it is contained in ammunition used at National Security and Park Service facilities. For 2020, several federal facilities reported using “green” ammunition in accordance with National Park Service policy to use non-lead ammunition where feasible. To find more examples of federal facilities’ source reduction activities and the source reduction barriers they face, visit [TRI’s P2 Search Tool](#) and select industry sectors such as National Security, Correctional Institutions or Police Protection from the dropdown menu under “search criteria.”