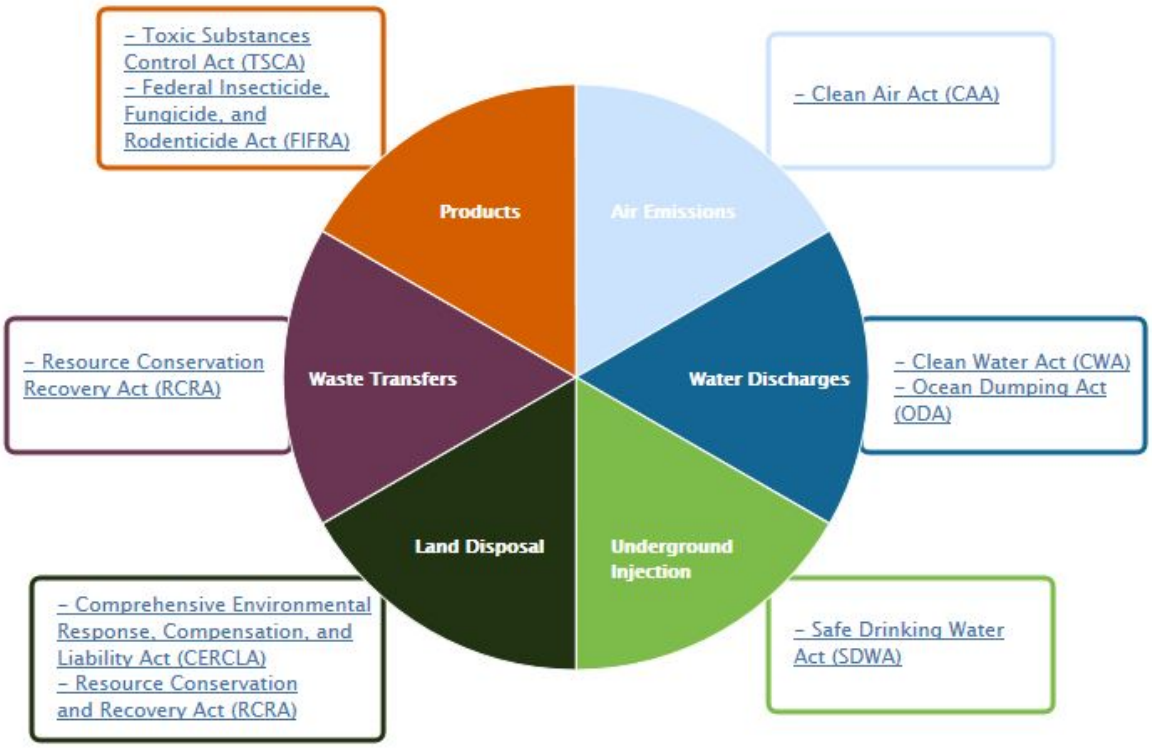
TRI & Beyond

TRI is a powerful resource that provides the public with information about how toxic chemicals are managed by industrial facilities in the United States. However, there are many other programs at EPA that collect information about chemicals and our environment.

Note: The Emergency Planning and Community Right-to-Know Act (EPCRA) establishes requirements for emergency planning, preparedness, and reporting on hazardous and toxic chemicals involving air releases, water releases, land disposal, waste transfers and waste management.

The next figure is an overview of laws that EPA carries out and the industrial processes they regulate. While many programs at EPA focus on one area, TRI covers releases to air, water, and land; waste transfers; and waste management activities. Therefore, TRI data are especially valuable, as they can be combined with many other datasets to provide a more complete picture of national trends in chemical use, management, and releases.



This chapter highlights three thematic areas that combine TRI with other data sources:

- Climate Change:
  - A comparison of TRI data and EPA's Greenhouse Gas Reporting Program (GHGRP) data collected under the Clean Air Act (CAA);
  - A comparison of TRI and GHG waste rates for different fuels using data from the Department of Energy's Energy Information Administration; and

  - A look at projected sea level rise in the United States relative to TRI facility locations using National Oceanic and Atmospheric Administration (NOAA) data.
- Surface Water
  - An analysis of TRI and EPA's Discharge Monitoring Report (DMR) data collected under the Clean Water Act (CWA).
- Chemical Safety:
  - An analysis of TRI and emergency planning data collected under the Clean Air Act (CAA), including Risk Management Plans (RMPs), and other sections of the Emergency Planning and Community Right-to-Know Act (EPCRA).

Comparing TRI and Greenhouse Gas Emissions

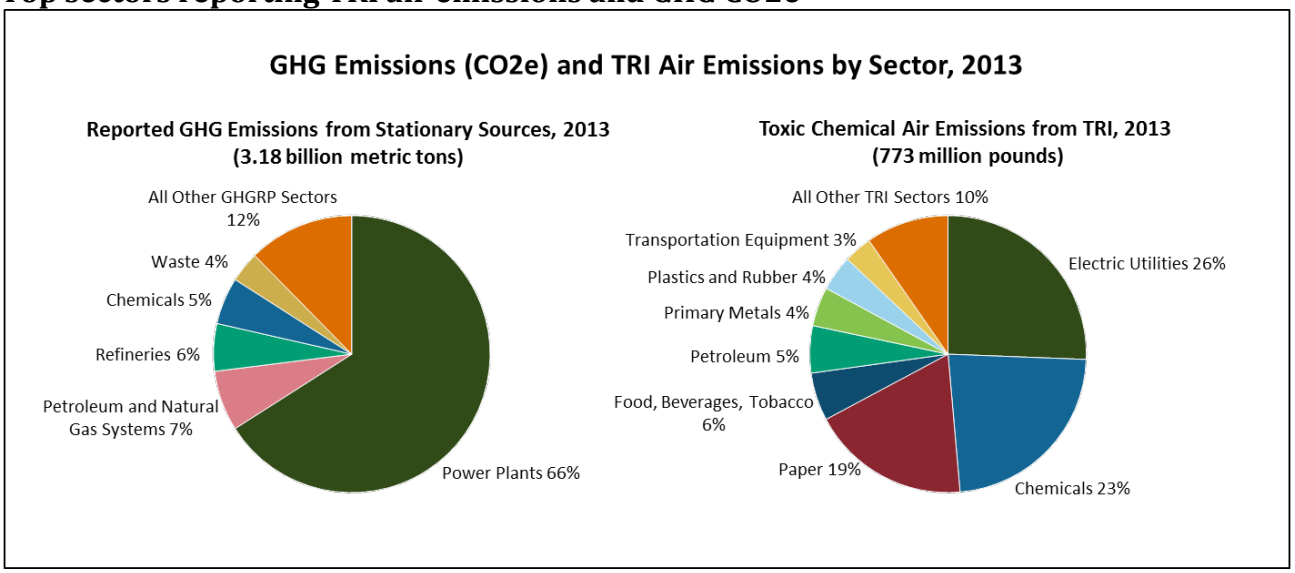
Under the authority of the Clean Air Act, EPA's Greenhouse Gas Reporting Program requires large emitters of greenhouse gases (GHGs) and suppliers of certain products to submit annual greenhouse gas reports to EPA. Emissions of GHGs lead to elevated concentrations of these gases in the atmosphere that alter the Earth's radiative balance and contribute to climate change. These elevated concentrations are reasonably anticipated to endanger both the public health and welfare of current and future generations. The purpose of the GHGRP is to collect timely, industry-specific data to help us better understand the source of GHG emissions and to inform climate policy.

What is CO_2e?
GHG emissions are typically expressed in a common metric, so that their impacts can be directly compared as some gases are more potent than others. The international standard practice is to express GHGs in CO_2e.

In 2013, over 7,800 facilities reported direct emissions of GHGs to the atmosphere, totaling over 3.18 billion metric tons of carbon dioxide equivalent ($mtCO_2e$). This represents about half of the 6.5 billion $mtCO_2e$ that EPA estimated to be released in the United States from all human-related sources per the 2012 annual U.S. Greenhouse Gas Inventory. The GHGRP does not require direct emissions reporting from all U.S. sources. For example, the transportation sector and agricultural sources of GHG emissions are not included in the GHGRP.

What chemicals were reported to GHGRP for 2013?
- Carbon dioxide = 91.4% of the $mtCO_2e$ total
- Methane = 7%
- Nitrous Oxide (N_2O) = 0.8%
- Fluorinated gases (HFCs, PFCs, SF_6) = 0.7%

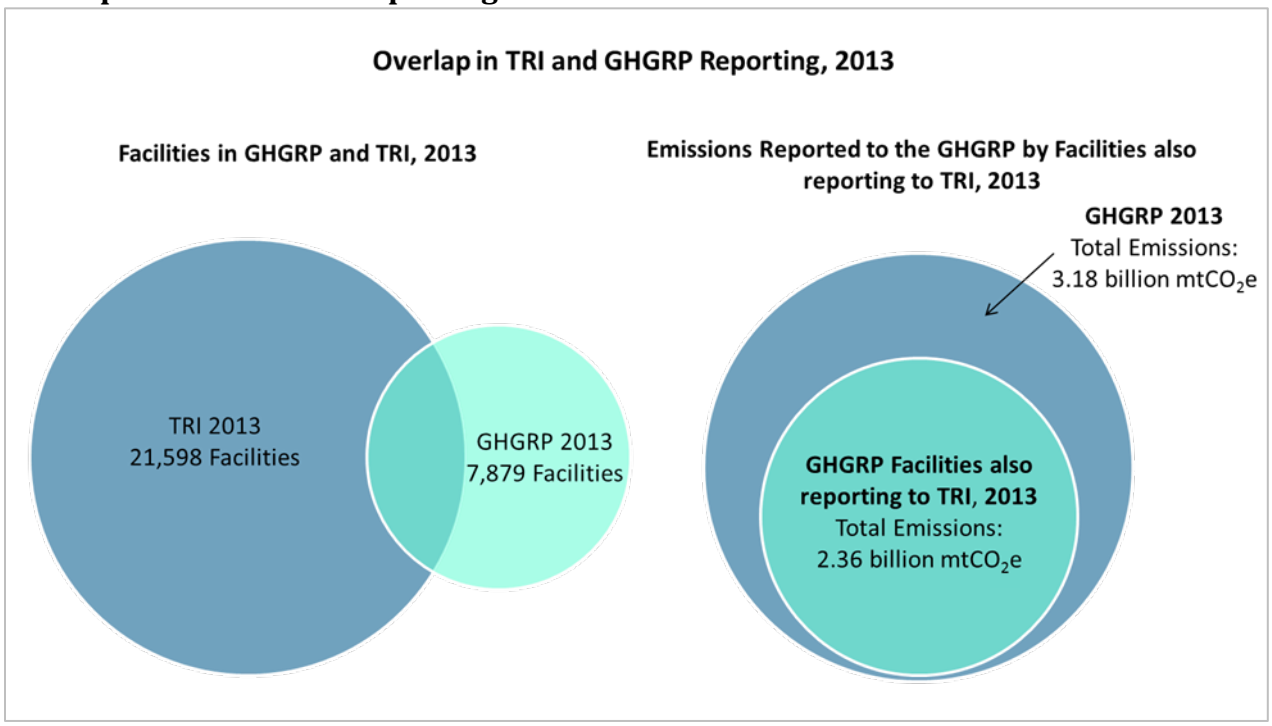
Top sectors reporting TRI air emissions and GHG CO2e



This figure shows the top sectors reporting air emissions to the GHGRP and TRI in 2013. The primary greenhouse gas reported to the GHGRP is carbon dioxide (CO_2), which is released during fossil fuel combustion and various industrial processes. TRI reporting focuses on toxic chemicals and therefore covers different chemicals from the GHGRP. Some TRI chemicals are a result of combustion of fuels for energy (as most GHG emissions are), but others are used in and released from additional processes ranging from metal mining to surface cleaning. Therefore, the top air emitting sectors in TRI are similar, but not identical to, the top emitting sectors covered by the GHGRP. While electric utilities are the primary reporters of air emissions to both programs, the chemical manufacturing industry reports more chemical air emissions to TRI than to the GHGRP. Analyzing toxic chemical releases reported to TRI and greenhouse gas emissions reported to the GHGRP together creates a more complete picture of emissions at the facility and sector levels.

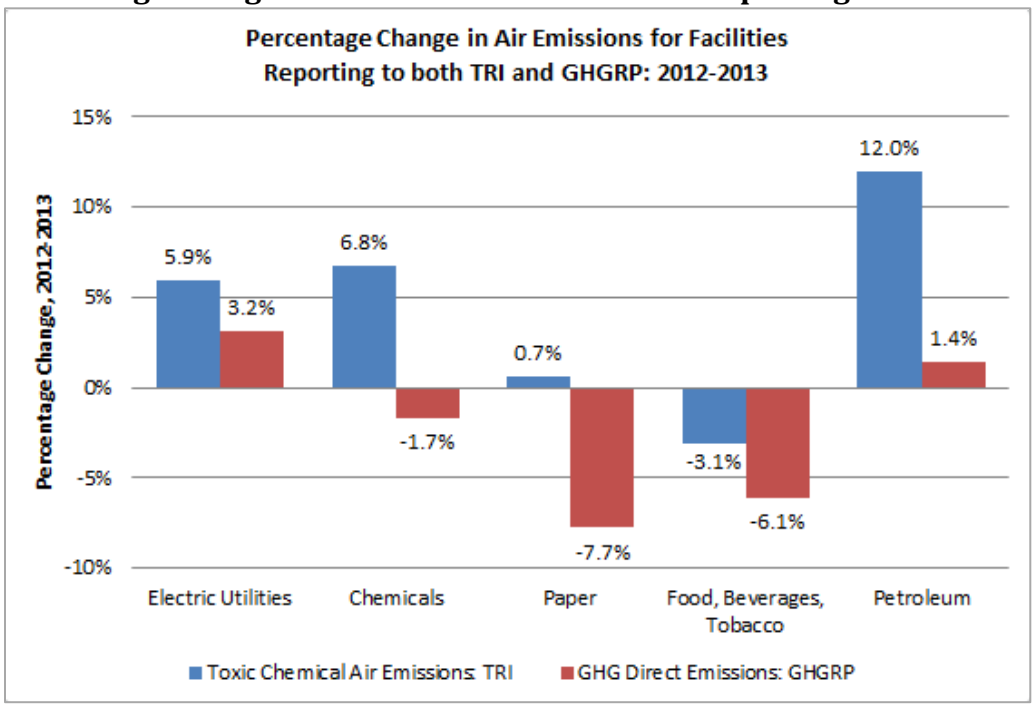
Note that in addition to differences in the chemicals reported to TRI and the GHGRP, there are numerous other program differences including reporting thresholds. For TRI, the reporting threshold for most chemicals is 25,000 pounds manufactured or processed, or 10,000 pounds otherwise used per year, whereas for the GHGRP, the reporting threshold is based on emissions and is generally 25,000 metric tons of carbon dioxide equivalent per year.

Overlap in TRI and GHG reporting



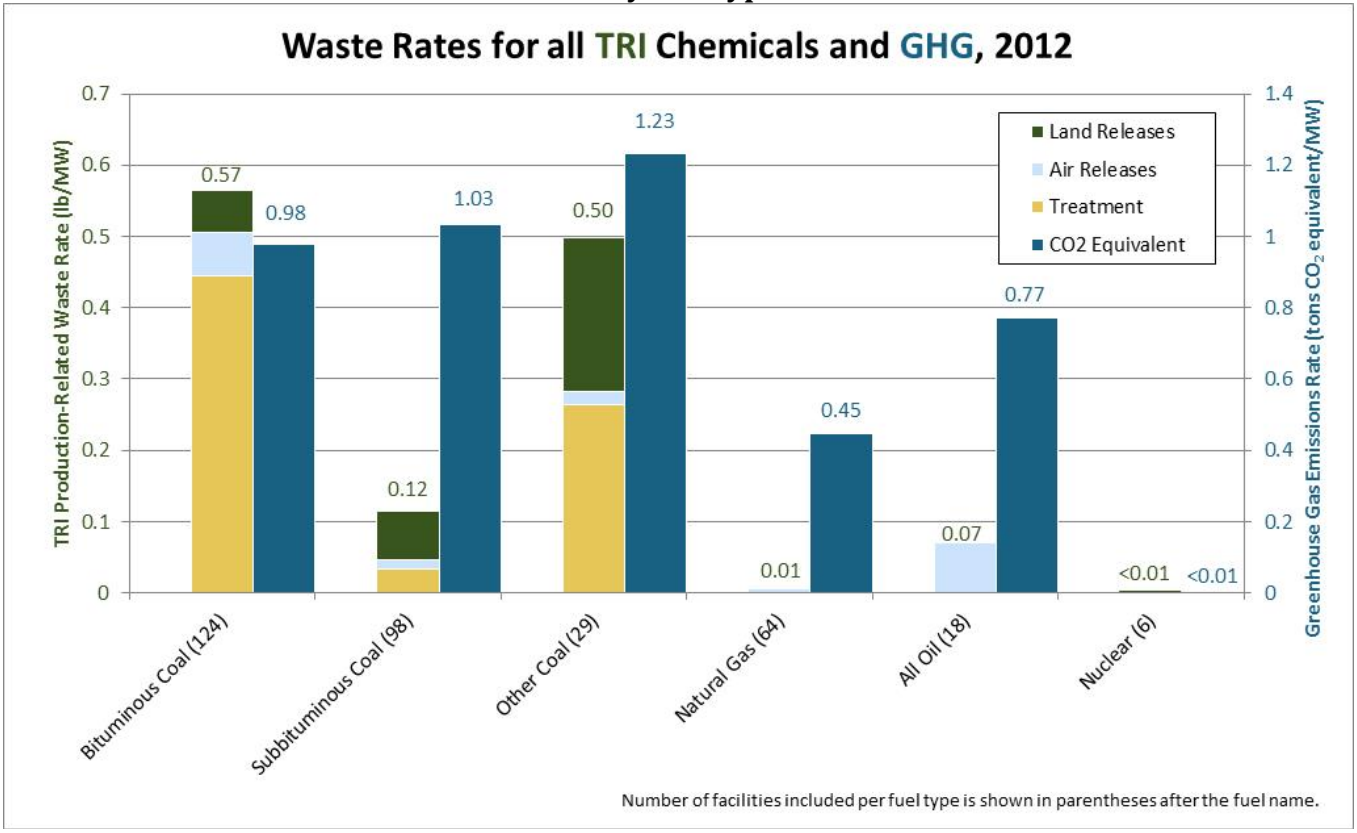
In 2013, more than one-third of the facilities reporting to GHGRP also reported to TRI. However, this subset of GHGRP reporters accounted for almost three-quarters of GHGRP emissions, indicating that the facilities reporting the greatest GHG emissions also trigger TRI requirements for reporting on toxic chemicals.

Percentage change in air emissions for facilities reporting to both TRI and GHGRP



This figure shows the percentage change in total air emissions from 2012 to 2013 for the subset of facilities reporting to both TRI and GHGRP, in the five industry sectors with the greatest TRI air emissions. While the graph is based on a consistent subset of facilities, the percentage change in emissions by industry sector varies between the two programs. The variations are driven by differences in the types of pollutants reported to TRI and GHGRP and by the impacts of certain source reduction and pollution control activities. Some actions taken by facilities, such as reducing fuel consumption, decrease emissions of both greenhouse gases and toxic chemicals that are byproducts of fuel combustion. Other actions, like the installation of new treatment technology, may reduce emissions of a specific TRI chemical but not affect greenhouse gas emissions.

TRI waste rates and GHG emissions rates by fuel type



This figure shows TRI waste management rates and GHG emission rates for facilities in the electric utilities industry that reported to both TRI and the GHGRP for 2012, the most recent year for which the facility-level fuel use data are available. By fuel type, the figure shows:

- **Bituminous coal** has the highest total TRI waste generation per megawatt hour (MWh) of electricity produced, most of which is treated for destruction. Of the coal types, however, bituminous coal has the lowest moisture content, making it the most efficient coal in terms of power generation. Bituminous coal therefore has the lowest GHG emission rate. West Virginia leads production of bituminous coal, followed by Kentucky and Pennsylvania.
- Among coal types, combustion of **subbituminous coal** generates significantly less acid aerosol than bituminous coal or other coal, resulting in a lower TRI waste generation rate. Wyoming produces the vast majority of subbituminous coal in the U.S.
- All **coal** combustion (bituminous, subbituminous, and other which includes lignite and waste coal) generates ash, which may be disposed of to land.
- Of the fossil fuels, **natural gas** has the lowest TRI air release rate and the lowest TRI waste management rate, as it contains lower levels of toxic chemicals in the fuel. Natural gas also has the lowest carbon content per energy quantity and as such, has a GHG emission rate considerably lower than that of coal and oil fuels.
- **Oil fuels**, consisting of distillate and residual fuel oil, have the highest air release rate of the fossil fuels. This reflects an absence of reported treatment methods at TRI

facilities burning oil. As oil fuels have a lower carbon content than coal, they have a lower GHG emission rate than coal, but greater than that of natural gas.

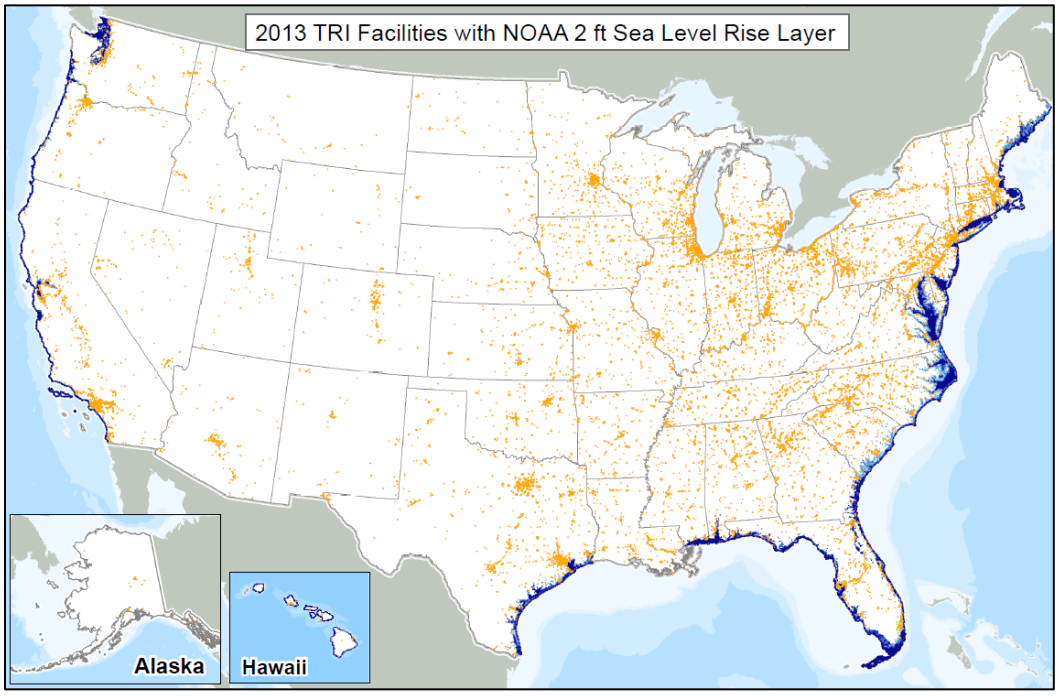
- Few **nuclear** power plants are required to report to TRI and the rates calculated in the graph are based on only six facilities. Based on these facilities' reporting, nuclear plants' generation rates for both toxics and GHGs are very low.

You can learn more about TRI reporting by electric utilities in the Electric Utilities Industry section.

Notes:

- This figure only includes electric utilities that combust some (even small amounts) of coal or oil; most natural gas electric utilities do not combust these fuels and therefore are not subject to TRI reporting.
- The figure includes waste rates for the primary TRI waste management methods for the sector: air emissions, land disposal, and treatment. Other TRI waste management methods, such as recycling and discharges to water, account for less than 1% of waste managed and therefore are not included in the figure.
- To ensure that the emissions were representative of the specific fuel types, 481 facilities were excluded from this graph because their fuel mix exceeded 1% of other fuel types.
- These rates are based on waste generated at the electric utility only and do not reflect the entire lifecycle of the fuel (e.g., they do not include extraction of the fuel).
- Data on the quantity of fuel used by facility are from the Department of Energy's Energy Information Administration.

TRI facilities and sea-level rise



Global sea-level rise has been a persistent trend for decades. It is expected to continue beyond the end of this century, which will cause significant impacts in the United States. Scientists have very high confidence (greater than 90% chance) that the global mean sea-level will rise at least 8 inches (0.2 meters) and no more than 6.6 feet (2.0 meters) by 2100.[1] This map displays facility locations that reported to TRI in 2013 with a preliminary look at the potential of a 2 foot sea-level rise as projected by NOAA. The blue areas on the coast show the potential sea-level rise inundation of 2 feet above the current Mean Higher High Water mark. Therefore, TRI facilities in or near this area may be inundated in a 2-foot sea-level rise scenario. Prior to any actual sea-level rise, many of these facilities face a higher potential to experience flooding or other weather-related damage due to periodic storm events.

Notes:

- These sea-level rise data are provided by NOAA's Coastal Services Center and illustrate the scale of potential flooding, not the exact location. They should only be used for screening-level visualization and should not be used for navigation, permitting, or other legal purposes.
- The NOAA sea-level rise map includes all states except for Louisiana and Alaska. There are no plans to map Alaska because of inadequate statewide coastal elevation data. Similarly, Louisiana is not included because of a lack of recent, accurate coastal elevation data and the difficulty in accurately flood mapping this coastal geography that includes a complex levee system. NOAA is discussing the issue with Louisiana officials.

For information about how the federal government is taking action to help Americans adapt to current and potential risks of climate change, see EPA's website on federal and EPA adaptation programs.

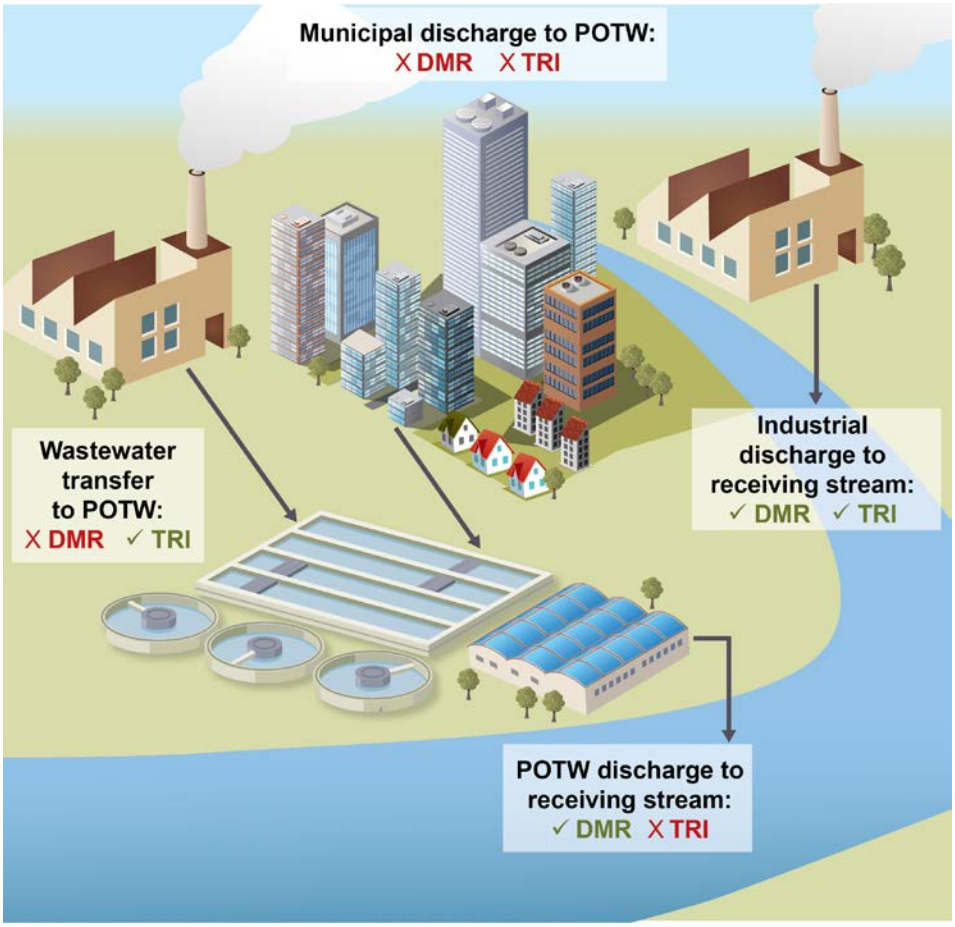
[1] http://cpo.noaa.gov/Home/AllNews/TabId/315/ArtMID/668/ArticleID/80/Global-Sea-Level-Rise-Scenarios-for-the-United-States-National-Climate-Assessment.aspx

Regulating chemical releases to water

EPA collects data on pollutant releases to water under the authority of the National Pollutant Discharge Elimination System (NPDES). The NPDES program aims to protect and restore the quality of U.S. rivers, lakes, and coastal waters through permits that control and require monitoring of pollutant discharges from point sources. Under the Clean Water Act (CWA), facilities are required to obtain a NPDES permit for all point sources that discharge pollutants into waters of the United States and report compliance with permit limits via monthly Discharge Monitoring Reports (DMRs).

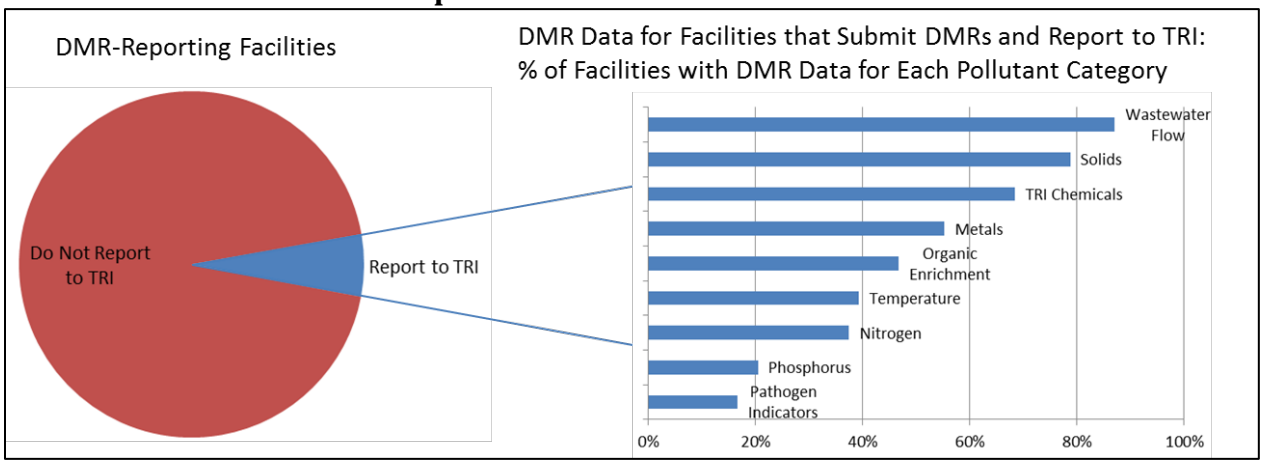
Through the DMRs submitted, the NPDES program collects data for the facility-specific parameters identified in the facility's NPDES permit. The DMR data may include release quantities of specific chemicals as well as other water quality measures, such as pH and temperature, flow rates, and conventional parameters such as biochemical oxygen demand and total suspended solids. Along with TRI data about toxic chemical releases to water, DMRs serve as a primary source of data on pollutant discharges to surface water.

This figure illustrates the types of wastewater streams that the TRI Program and DMR data describe.



TRI data capture discharges to receiving streams and chemical transfers to Publically Owned Treatment Works (POTWs) from industrial facilities. DMR data capture discharges to receiving streams by both industrial facilities and POTWs, but do not capture transfers from an industrial facility to a POTW. Neither data set captures municipal discharges to POTWs.

DMR data for facilities that report to TRI

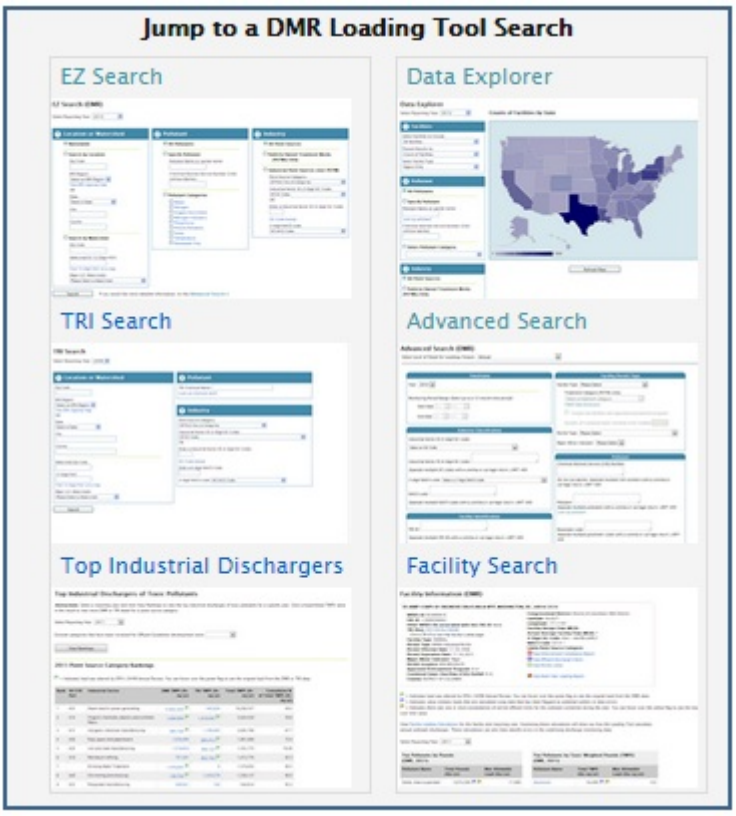


While the data collected by TRI and DMRs differ in important ways, using both TRI and DMR data provides a more complete understanding of pollutants being discharged into surface waters. As shown in the pie chart, 6% of the facilities that submit DMRs also report to TRI. The bar graph focuses on this subset of facilities that report to TRI and submit DMRs. Through their DMRs, these facilities provide information on many other parameters that may impact water quality, such as the temperature, or biochemical or chemical oxygen demand (i.e., organic enrichment) of their water discharges.

There are several considerations to keep in mind when comparing TRI and DMR data:

- **Reporting Facilities:** Permitting authorities, such as the states, are not required to report DMR measurements for smaller, non-major, facilities. In addition, facilities may be exempt from reporting to TRI if they are not in a covered industry sector or does not meet the threshold number of employees.
- **Regulated Chemicals:** In the DMR data, facilities only report discharges of pollutants that the NPDES permit requires them to monitor. The pollutants with monitoring requirements in a facility's NPDES permit are at the discretion of the permitting authority. Other pollutants may be discharged but are not reported on DMRs. TRI facilities only report chemicals on the TRI list, and may be exempt from reporting releases of chemicals if they do not meet activity thresholds.

DMR and TRI data can be explored together using the DMR Pollutant Loading Tool. This tool provides information on which facilities are discharging pollutants to surface water, what pollutants and how much of each they are discharging, and where these discharges occur. Explore the tool to learn more about discharges of pollutants to surface waters in your community.


Jump to a DMR Loading Tool Search
EZ Search
Data Explorer
TRI Search
Advanced Search
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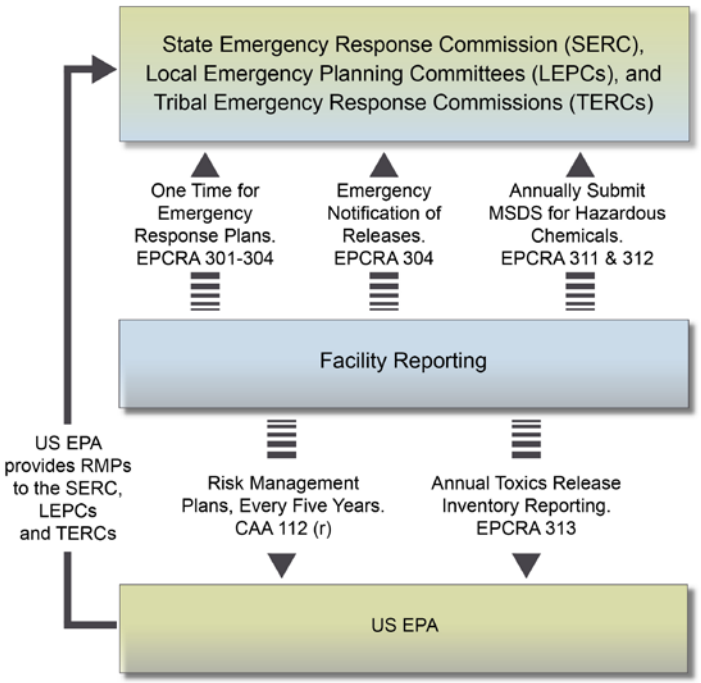
Facility Search

Chemical safety and emergency planning

In the wake of recent chemical spills and accidents at facilities in Texas, West Virginia and North Carolina, the government has renewed focus on chemical safety and accident preparedness. On August 1, 2013, the President signed Executive Order 13650 to improve the safety and security of chemical facilities and reduce the risks of hazardous chemicals to workers and communities. The order directs the federal government to improve operational coordination with state and local partners, and enhance Federal agency coordination and information.

Both the Emergency Planning and Community Right-to-Know Act (EPCRA) and (which includes the Toxics Release Inventory) the Clean Air Act (CAA) section 112(r) Risk Management Program encourage communication between facilities and the surrounding communities about chemical safety and chemical risks. The programs implemented under these regulations are intended to encourage state, local, and tribal planning for, and response to, releases of hazardous substances; to provide the public, local governments, fire departments, and other emergency officials with information concerning potential chemical hazards present in their communities; and to prevent and minimize the impact of chemical releases.

TRI data, along with other EPCRA and risk management data on chemical storage and use, provide a greater understanding of potential hazards in communities.



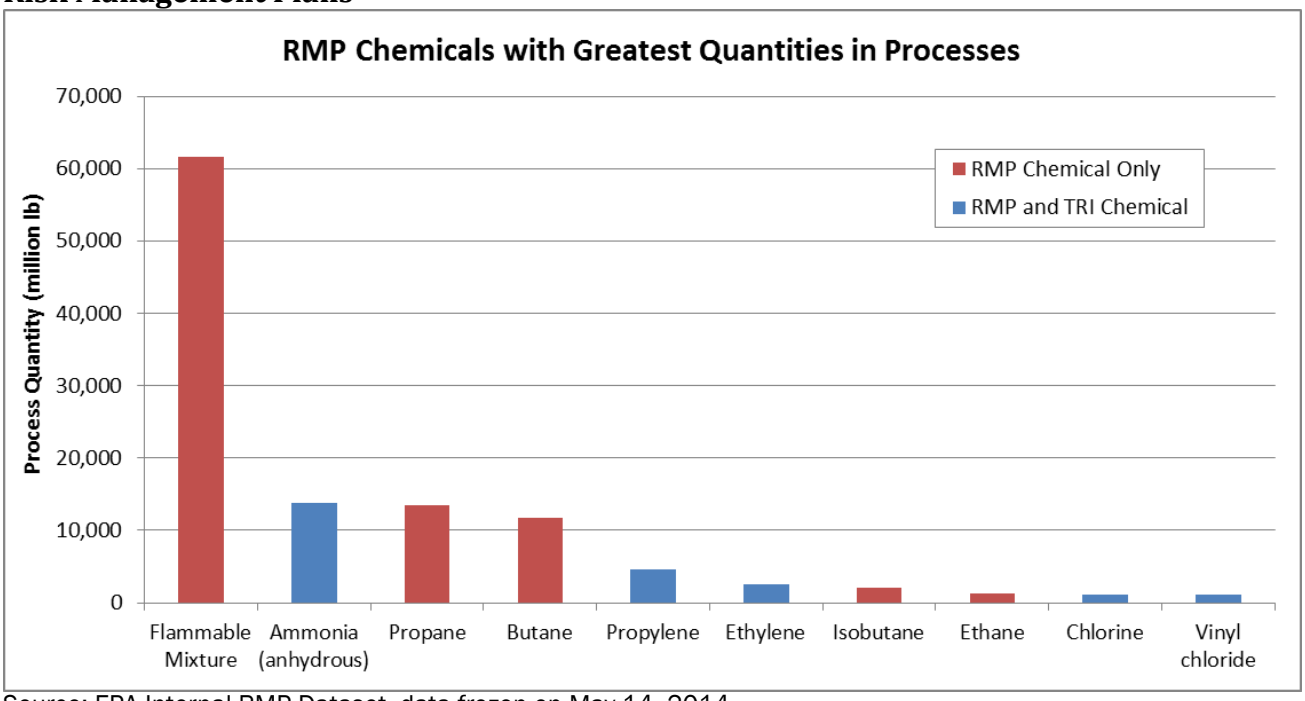
EPCRA, enacted in 1986, has four major provisions. The Community Right-to-Know provisions cover TRI (section 313) and the hazardous chemical storage reporting requirements (sections 311-312). Other EPCRA sections focus on emergency planning (sections 301-303) and emergency release information (section 304). Separately from EPCRA, CAA section 112(r) establishes the Risk Management Plan rule and helps to reduce harm from extremely hazardous substances (EHS). Facilities covered report information to the respective authorities as noted in the diagram.

The types of hazardous and toxic chemicals covered by the RMP and each of the EPCRA provisions differ as shown in the table below. A broad array of chemicals is also covered, more extensive than the 650 chemicals and chemical categories covered by TRI.

Chemicals Covered by EPCRA and CAA 112(r)	
EPCRA 301-303	355 extremely hazardous substances (EHS)
EPCRA 304	355 EHS and approximately 800 specific substances and 1,500 radionuclides under CERCLA
EPCRA 311/312	More than 500,000 hazardous substances with material safety data sheets (MSDSs)
EPCRA 313	More than 650 toxic chemicals and chemical categories
CAA 112(r)	77 EHS and 63 flammable gases and liquids

Regulatory requirements by themselves will not guarantee safety from chemical accidents. Those who are handling hazardous substances must take the responsibility and act to prevent, prepare for, and respond to chemical emergencies. For extremely hazardous substances (EHS), a facility must notify the appropriate officials and participate in local emergency planning activities. This includes preparation of an emergency response plan that contains information community officials can use at the time of a chemical accident. A facility covered under the RMP Rule is required to submit a Risk Management Plan (RMP) to EPA. Currently, approximately 13,000 facilities have an active RMP.

Risk Management Plans



Source: EPA Internal RMP Dataset, data frozen on May 14, 2014.

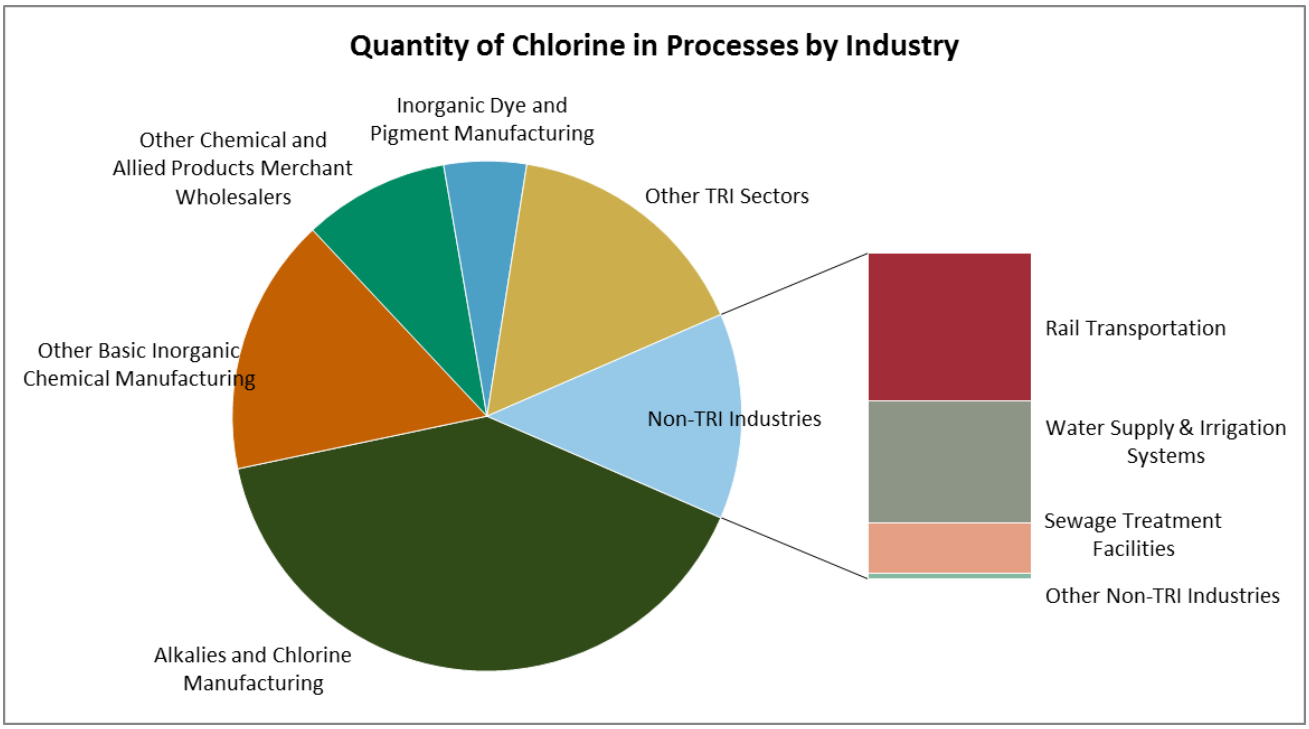
The Risk Management Plan (RMP) complements TRI in that it provides details on chemical hazards and emergency planning. RMP and TRI cover some, but not all, of the same chemicals, as shown in this figure. RMP reporting includes 77 acutely toxic chemicals and 63 flammable gases or highly volatile flammable liquids – 53 of which are also individually listed TRI chemicals. The RMP chemical with the greatest quantity processed at facilities is "flammable mixture," which can consist of mixtures of different flammable gasses and liquids such as propane, butane and isobutane.[2] Chemical reporting thresholds also differ between TRI and RMP – RMP thresholds vary from 1,000 to 20,000 pounds of chemicals in a process, while TRI thresholds reflect total annual use. Approximately 2,700 facilities report to both TRI and RMP. RMP also provides information on many sectors not covered by TRI, such as Sewage Treatment Facilities.

RMP and TRI data complement each other when a facility reports under both programs. RMP submissions provide details on where the chemical is used and how the facility prevents and prepares for accidental releases. TRI data provide details on the process-related, non-accidental releases of the chemical. In the following graphics, chlorine is used as an example of how TRI and RMP data may be combined for a more complete picture of the facility's handling of the chemical.

[2] Flammable mixtures are covered under RMP if a regulated substance is in the mixture above 1 percent and the entire mixture meets the National Fire Protection Association flammability hazard rating of 4 (NFPA-4).

Example chemical: Chlorine reported in RMP & TRI

Chlorine is reported to both TRI and RMP. It is one of the most commonly manufactured chemicals in the United States, with a domestic production volume of 22 billion pounds in 2011.[3] It is used in industrial operations primarily as a chemical reactant, but is also widely used as a bleach or disinfectant. While chlorine can be pressurized and cooled to a liquid for storage and shipment, when liquid chlorine is released, it quickly turns into a gas that stays close to the ground and spreads rapidly. Chlorine gas irritates the respiratory system, and as a strong oxidizer, it may react strongly (e.g., explosively) with other materials. Data over the past five years show that there have been 588 accidents, resulting in 749 injuries, one death, and an estimated $128 million in property damage.[4,5] Proper management of chlorine at industrial facilities is vital to workers and the surrounding community.



Chlorine is covered by RMPs in over 3,300 facilities from May of 2009 to May of 2014, with approximately 808 million pounds in processes. The top industries by pounds of chlorine are Chemical Manufacturing and Chemical Wholesalers, as shown in the figure. These industry sectors also report to TRI. When viewed by counts of facilities, the two industries with the most facilities reporting chlorine in processes in an RMP are water supply and irrigation systems (1,401 facilities) and sewage treatment facilities (703 facilities). Neither of these industries is required to report to TRI.

[3] http://www.epa.gov/cdr/
[4] EPA Internal RMP Dataset, data frozen on May 14, 2014.
[5] Injuries and damages include all accidents at the facilities, not just those involving chlorine.

Facilities report different types of information in an RMP than to TRI. For example, a facility in Charleston, TN, reported in its 2013 RMP:

- Quantity in processes: 33.8 million pounds of chlorine in its chlor-alkali process in 100% concentration as gas liquefied by pressure
- Accident history: In 2005, over-pressurization of a line, caused by human error, resulted in an accidental release of less than 1 pound of chlorine

For 2013, the same facility reported to TRI 272.7 pounds of chlorine air releases. Taken together the data provide a more complete picture of the facility's handling of the chemical.

For more information, please visit the EPCRA webpage. To learn more about Risk Management Plans, see the RMP Rule webpage. The public may access RMP data at Federal Reading Rooms. For more information on TRI, see EPA's TRI webpage.