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Guide to Using PRTR Data for International Analyses

Series on Prevention and Control of Pollutant Releases

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The Organisation for Economic Co-operation and Development (OECD) is an intergovernmental organisation in which representatives of 38 countries in North and South America, Europe and the Asia and Pacific region, as well as the European Union, meet to co-ordinate and harmonise policies, discuss issues of mutual concern, and work together to respond to international problems. Most of the OECD's work is carried out by more than 200 specialised committees and working groups composed of member country delegates. Observers from several Partner countries and from interested international organisations attend many of the OECD's workshops and other meetings. Committees and working groups are served by the OECD Secretariat, located in Paris, France, which is organised into directorates and divisions.

The Environment, Health and Safety Division publishes free-of-charge documents in twelve different series: Testing and Assessment; Good Laboratory Practice and Compliance Monitoring; Pesticides; Biocides; Risk Management; Harmonisation of Regulatory Oversight in Biotechnology; Safety of Novel Foods and Feeds; Chemical Accidents; Pollutant Release and Transfer Registers; Emission Scenario Documents; Safety of Manufactured Nanomaterials; and Adverse Outcome Pathways. More information about the Environment, Health and Safety Programme and EHS publications is available on the OECD's World Wide Web site: https://www.oecd.org/en/topics/chemical-safety-and-biosafety.html

This publication was developed in the IOMC context. The contents do not necessarily reflect the views or stated policies of individual IOMC Participating Organizations.

The Inter-Organisation Programme for the Sound Management of Chemicals (IOMC) was established in 1995 following recommendations made by the 1992 UN Conference on Environment and Development to strengthen co-operation and increase international co-ordination in the field of chemical safety. The Participating Organisations are FAO, ILO, UNDP, UNEP, UNIDO, UNITAR, WHO, World Bank, Basel, Rotterdam and Stockholm Conventions and OECD. The purpose of the IOMC is to promote co-ordination of the policies and activities pursued by the Participating Organisations, jointly or separately, to achieve the sound management of chemicals in relation to human health and the environment.

Foreword

The OECD adopted the first Recommendation on Establishing and Implementing Pollutant Release and Transfer Registers (PRTRs) in 1996. Since then, the OECD has worked with governments, industry, and non-governmental organisations to develop practical tools that facilitate implementation efforts by member countries, provide outreach to partner countries, and coordinate international activities. To help member countries implement efficient and effective PRTRs, the OECD Working Party on PRTRs (WP-PRTRs) develops and disseminates practical tools and guidance with a focus on improving PRTR data quality, exploring PRTR data applications, and harmonising PRTRs across countries.

Numerous resources now present data from multiple PRTR systems. However, users can face challenges in understanding the differences among PRTRs that influence how the data is displayed. This underscores the need for clear guidance on interpreting cross-PRTR data.

To address the need, a project to develop a Guide to Using PRTR data for International Analysis was launched under the WP-PRTRs in 2024. A dedicated subgroup was established to facilitate detailed discussions, with participation from delegates representing Canada, Japan, Sweden, the United States and the UNECE Secretariat.

This document was drafted by the United States, which led the analysis and discussions. The document was prepared under the supervision of the WP-PRTRs and published under the responsibility of the Chemicals and Biotechnology Committee.

Executive Summary

Currently, over 50 countries have established or are in the process of implementing Pollutant Release and Transfer Registers (PRTRs), with more expected to follow in the coming years. Many PRTRs now have extensive time series data for analysis including Europe, the United States, Japan, Australia, Canada, Korea, Israel, Chile, and Mexico. These established PRTRs continue to collect annual data, while newer PRTRs mature, and other PRTRs are initiated, further enhancing the global coverage of cross-PRTR analyses.

PRTRs are typically designed to meet the needs of a specific country or region, with less attention being given to the comparability of the data among different countries' PRTRs. Consequently, PRTRs around the world have differing reporting requirements. These differences make it challenging to conduct comparative analyses of the PRTR data from different countries. When compiling and analysing data across multiple PRTRs, users must carefully consider how the differences in reporting requirements impacts the results. This document guides how to interpret analyses of data across PRTRs, given these inherent variations.

The guide summarises the key differences among PRTRs that influence international analyses, particularly those affecting data comparability. For each key difference identified, the guide presents analytical methods to address the differences when conducting multi-national analyses. These include approaches to address differing chemicals and sectors, thresholds, economic activity, timeframe for data available, and units and language. To illustrate the application of the approaches, the guide provides a series of example analyses such as high-level trends, sector-specific comparisons, toxicity-weighted assessments, chemical-specific analyses, and normalisation by economic activity, with guidance on how to interpret the results.

Conducting global or multi-country analyses of PRTR data poses challenges due to differences in national reporting requirements. To support the growing need for global analyses, this guide recommends two key actions: (i) countries can contribute to strengthening international analyses by improving the harmonisation of their PRTR data with other PRTR systems when modifying existing PRTRs or designing new ones, and (ii) analysts should account for differences among PRTRs when interpreting results, as illustrated in the examples provided in this document, which helps ensure that analyses remain meaningful and comparable.

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1. Introduction

Pollutant Release and Transfer Registers (PRTRs) are typically designed to meet the needs of a specific country or region, with less attention being given to the comparability of the data among different countries' PRTRs. Consequently, PRTRs around the world have differing reporting requirements. These differences make it challenging to conduct comparative analyses of the PRTR data from different countries. The most significant differences for international data analyses are in the pollutants and sectors or activities covered, and the reporting thresholds. When compiling and analysing data across multiple PRTRs, users must consider the impacts of the differences in reporting requirements on the results. This document provides guidance on how to interpret analyses of data across PRTRs, given these inherent differences.

1.1. Why PRTRs Differ

PRTRs are national programmes developed to address the needs and priorities of the country developing the PRTR. While national circumstances differ by country, PRTRs globally share the same objectives of collecting facility-level data on releases and off-site transfers of potentially harmful chemicals to the air, water, and land; and making these data available to the public. These common core elements of PRTRs serve as the basis for data analyses across PRTRs once the differences are identified and addressed.

The types and size of industrial sectors in a country influences what sources are required to report to the PRTR and what chemicals are covered. Existing regulations also impact a country's PRTR. For example, a country that has banned a chemical may not list that chemical on their PRTR, while a country considering tighter regulation of the same chemical may add it to the PRTR to collect data on releases before implementing new regulations.

Some PRTRs have a broader scope than collecting the core release and transfer data on chemical waste. For example, some PRTRs include data on diffuse sources as well as point sources. Other PRTRs include data on waste recycling, treatment, and pollution prevention activities, in addition to releases. Because data beyond the core information on chemical releases and transfers has not been consistently adopted across PRTRs, this document focuses on analysing the core data – pollutant releases and transfers – collected by PRTRs.

For more information on why PRTRs differ in their scope and reporting requirements, refer to the OECD publication, *Why Pollutant Release and Transfer Registers (PRTRs) Differ*.[1]

1.2. Summary of existing PRTRs

Currently over 50 countries have established or are in the process of implementing PRTRs, with more expected to follow in the coming years. Many PRTRs now have extensive time series data for analysis including Europe, the United States, Japan, Australia, Canada, Korea, Israel, Chile, and Mexico. These

[1] OECD, *Why Pollutant Release and Transfer Registers (PRTRs) Differ: A Review of National Programmes,* ENV/JM/MONO(2001)16. < https://prtr.unitar.org/site/document/1240

established PRTRs continue to collect annual data, while newer PRTRs mature, and other PRTRs are initiated, further enhancing the global coverage of cross-PRTR analyses.

The European PRTR is unique in that it consolidates data for the region from industrial facilities in European Union (EU) Member States plus Iceland, Liechtenstein, Montenegro, Norway, Serbia, Switzerland and the United Kingdom (from the reporting year 2020, only Northern Ireland reports limited information). It has been referred to as the European Pollutant Release and Transfer Register (E-PRTR), however, it will be replaced by the Industrial Emissions Portal Regulation (IEPR) in 2028 following revisions to improve access to information and alignment with other EU environmental laws. Some individual countries reporting under the E-PRTR collect additional data as part of their national system.

Another important event for PRTR implementation was the Kyiv Protocol on PRTRs, which entered into force in 2009. The Kyiv protocol requires its Parties to establish a PRTR adhering to certain minimum requirements[2]. Countries must establish a PRTR aligning with these requirements as a prerequisite to membership in the Organisation for Economic Cooperation and Development (OECD) as well as for accession to the European Union. As such, most countries establishing PRTRs since the adoption of the Kyiv protocol have aligned with the standards of that protocol.

Over the decades since PRTR implementation began, international organisations have actively supported the development of PRTRs by providing guidance, resources, and tools to facilitate their establishment and broaden the application of PRTR data. This wealth of available resources can help analysts understand PRTRs and their differences, including publications from:

- **OECD**. The OECD PRTR website includes an extensive library of PRTR publications.
- **UNECE** (United Nations Economic Commission for Europe). The UNECE Protocol on PRTRs promotes consistency among PRTR systems, and the PRTR.net website provides access to PRTR resources and guidance.
- **UNITAR** (United Nations Institute for Training and Research). UNITAR's Chemicals and Waste Management Programme provides support to governments and stakeholders in strengthening institutional, technical, and legal capacities for sound management of chemicals. The UNITAR PRTR Platform provides resources, training materials, and tools for PRTR development.

[2] For more information see the United Nations Economic Commission for Europe site on the Kyiv protocol: https://unece.org/env/pp/protocol-on-prtrs-introduction

2. Comparability summary

This section summarises the main differences between PRTRs, with a focus on those differences that can impact international (i.e., cross-PRTR) analyses.

2.1. Differences in PRTRs that impact international analyses

Although PRTRs vary in many ways, the factors that most affect international data comparability are the pollutants and sectors or activities they cover, their reporting thresholds, and the size and composition of the country's economy. While pollutants, sectors, and thresholds are inherent to the design of each PRTR, economic activity is an external factor that must also be considered when interpreting multi-national PRTR data. These factors are summarised for several PRTRs in Table 2.1. Analytical approaches for addressing each factor are discussed in Section 3, and Section 4 presents a series of example analyses with guidance on how to interpret the results.

2.2. Differences in PRTRs summary table

To provide context on the differences among PRTRs, Table 2.1 provides an overview of key reporting requirements for several well-established PRTRs. Currently this table includes five long-established PRTRs: Australia, Canada, the European PRTR (E-PRTR), Japan, and the United States.

Table 2.1. Summary of PRTR requirements that can impact data interpretation

PRTR	TRI (United States)	E-PRTR (EU+)	NPRI (Canada)	Japan PRTR	NPI (Australia)
Approx. number of pollutants	>800	91 (until IEPR regulation takes effect in 2028)	>300	>500	93
Sectors required to report	Defined by NAICS codes and includes: manufacturing, metal mining, electric utilities combusting coal or oil, hazardous waste management, petroleum bulk terminals, natural gas processing and others	Based on activities listed in Annex I	Does not have sector requirements; reporting is based on specific activities and other criteria	24 business categories, including manufacturing, metal mining, electric utilities, fuel retailers, and others	Defined by ANZSIC codes and includes manufacturing, agriculture, metal mining, electric utilities, waste management, and others
Sector designation system used	NAICS codes; crosswalk to convert to ISIC codes	Facility-level NACE codes; crosswalk to convert to ISIC codes. Activity codes do not harmonise to ISIC but can be used for Europe-only analyses.	NAICS codes; crosswalk to convert to ISIC codes	JSIC; crosswalk to convert to ISIC codes	ANZSIC; crosswalk to convert to ISIC codes
Thresholds basis	Based on amount manufactured, processed or otherwise used Facility-level employment threshold	Based on amount released to each medium	Substance list is divided into five parts, based on specific reporting criteria for each part. Thresholds based on amount manufactured, processed, or otherwise used; or on the amount released; or dioxins are based on engaging in certain activities	Based on amount handled	Varies by pollutant; majority are based on amount manufactured, processed, or otherwise used Certain pollutants have thresholds based on emissions/transfers, combustion quantities, energy use, or power consumption
Specific Media	On site: Air (stack/point source and fugitive)	On site: Air Water	On site: Air (stack/point source and fugitive)	On site: Air Water	On site: Air (stack/point source and fugitive)

Reported	Water Land (including releases directly to land, disposal in landfills, underground injection, surface impoundments, other) Off-site transfers for disposal, recycling, energy recovery, treatment	Land (land treatment or deep injection) Off-site transfers for recovery or disposal (other than for land treatment or deep injection)	Water Land (including releases directly to land and disposal in landfills, underground injection, etc. Off-site transfers for disposal, recycling, energy recovery, treatment	Soil and landfills Off-site transfers to sewage and to industrial waste contractors	Water Land (landfill, underground injection, tailings storage, long-term storage) Off-site transfers for disposal or treatment
Number of facilities reporting	>21,000 for 2022	>50,000 for 2022	>7,000 for 2022	>32,000 facilities for 2022	>4,000 facilities for 2022
Country GDP [3] in 2023 (trillion US$)	27.7	18.6 (current EU countries)	2.2	4.2	1.7
PRTR website	https://www.epa.gov/toxics-release-inventory-tri-program	https://industry.eea.europa.eu/#/home	https://canada.ca/npri	https://www.env.go.jp/chemi/prtr/risk0.html	https://www.dcceew.gov.au/environment/protection/npi

[3] World Bank national accounts data, https://data.worldbank.org/indicator/NY.GDP.MKTP.CD accessed July 7, 2025.

3. Key considerations and analytical approaches

When analysing multiple PRTRs, there are common considerations that apply to most types of analyses. This section discusses the key factors to consider and presents some analytical methods to address these considerations. Note that the specific analytical method for any analysis will depend on the analyst's objectives, including the scope of the analysis, intended uses of the results, and the available data. Section 4 provides examples of analyses using these methods and demonstrates how to interpret the results.

3.1. Limitations for any PRTR analysis

PRTR data can provide valuable insights, but, like all information sources, PRTRs have limitations related to their scope and coverage that influence how the data are interpreted:

- **Data quality.** While most PRTRs implement quality assurance measures to address data quality issues and reporting errors, several sources of uncertainty remain such as from the wide variation in the release estimation techniques that facilities use for estimating release quantities. Some releases are based on consistent monitoring data while other reported quantities are estimated based on professional judgement.
- **Contextual information**. Additional data sources may be required to fully interpret PRTR data. Other sources of information might be necessary to assess chemical processes at facilities, the quantities of chemicals incorporated into products, production changes, chemical toxicity, or populations potentially exposed to the substances released.
- **Coverage within a country**. Not all facilities that release or transfer pollutants are required to report to PRTRs. Reporting is limited to facilities that meet specific criteria, such as exceeding reporting thresholds, employing a certain number of workers, or operating in an industry sector subject to PRTR reporting requirements. These requirements are discussed in more detail below.
- **Global coverage**. Some major manufacturing countries, such as China and India, do not have PRTRs in place. As a result, global analyses of PRTR must account for this gap when interpreting the data. Despite this limitation, PRTRs remain the most comprehensive and reliable time series data on pollutant releases and transfers available.

3.2. Key consideration: Differing chemicals covered

There is considerable variation in the chemicals covered by each PRTR as noted in Table 2.1. Some pollutants are listed by all or almost all PRTRs, but many are listed only by some or just one PRTR. When analysing data for a specific chemical from multiple PRTRs, it is critical to understand if the selected chemical(s) are required to be reported to the PRTRs in the analysis. In addition, some PRTRs list chemical groups, while other PRTRs may include the same chemicals individually. These differences can also influence results.

Analytical approach to address differences in chemicals covered

When analyses of data from multiple PRTRs are limited to the chemicals consistently covered across the PRTRs of interest, impacts on analytical results due to the differences in chemical coverage are minimised. In addition, the chemicals covered by multiple PRTRs generally represent those that are identified by numerous countries to be of greater importance due to their potential to impact human and environmental health.

To support cross-PRTR analyses, OECD's Working Party on PRTRs (WP-PRTR) developed and maintains a Harmonised List of Pollutants document[4]. The harmonised list provides valuable information for analysing multiple PRTRs, including: 1) a "Long Chemical List" that combines the pollutants covered by five PRTRs[5] and the Kyiv Protocol, and refines the list so that chemicals are listed consistently by Chemical Abstract Services (CAS) number and duplicates are removed; and 2) a "Short Chemical List" that includes chemicals that are covered by at least four of the five PRTRs, are persistent organic pollutants, are greenhouse gases, or are covered under the Kyiv Protocol.

The Long Chemical List serves as a reference to assess which pollutants are listed in the PRTRs, while the Short Chemical list serves as a resource for analysts to identify chemicals that are common to the PRTRs of interest. To further facilitate analyses, OECD publishes these lists in an Excel format[6] for easy integration into analyses. Recognising that some analyses focus on a class of chemicals rather than individual chemicals, the lists also categorise chemicals by class such as metals, PFAS, and polycyclic aromatic compounds.

3.3. Key consideration: Differing sectors covered

Most PRTRs cover virtually all manufacturing sectors or manufacturing activities. However, there is variation in whether non-manufacturing sectors, such as mining, electricity generation, and waste management, are included. Additionally, some PRTRs, such as E-PRTR, define coverage by activities rather than by sectors. For some PRTRs, such as in Mexico, sector coverage may be determined by the country's regulatory scheme that establishes the PRTR.

Analytical approach to address differences in sectors covered

When analyses of data from multiple PRTRs are limited to the sectors consistently covered across the PRTRs of interest, impacts on analytical results due to the differences in sector coverage are minimised.

To support cross-PRTR analyses, the OECD WP-PRTRs also developed a Harmonised List of Sectors[7]. The harmonised list provides valuable information for analysing multiple PRTRs, including: 1) a "Long Reporting Sector List" that combines the pollutants covered by five[8] PRTRs and the Kyiv Protocol; and 2) a "Short Reporting Sector List" that includes sectors that are partially or fully covered by at least four of the five PRTRs.

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[4] OECD (2022), *Harmonised List of Pollutants for Global Pollutant Release and Transfer Registers (PRTRs)*, OECD Publishing, https://doi.org/10.1787/39657758-en

[5] PRTRs included in the harmonised list are Australia, Canada, EU, Japan, and the United States.

[6] OECD (2022), *Harmonised List of Pollutants for Global Pollutant Release and Transfer Registers (PRTRs)*, "Support Materials," OECD Publishing, https://doi.org/10.1787/39657758-en.

[7] OECD (2013), *Proposal for a Harmonised List of Reporting Sectors*, OECD Publishing, https://doi.org/10.1787/6e8f2c98-en

[8] PRTRs included in the harmonised list are Australia, Canada, European PRTR, Japan, and the United States

While CAS numbers are commonly used globally as chemical identifiers, countries typically use their own classification system for economic sectors. To develop the Long and Short Reporting Sector Lists, the reporting sectors covered by each PRTR, along with those from the UNECE Kyiv Protocol, were mapped to a single, standardised industry classification system: the United Nations' International Standard Industrial Classification of All Economic Activities (ISIC). ISIC was chosen because it provides a detailed, hierarchical framework covering all industries and is commonly used in global analyses, making it ideal for consistent sector designations. The sector designation codes for each PRTR were mapped to the corresponding ISIC codes. Crosswalks are readily available between ISIC and the other industry classification systems used by several PRTRs. One complicating factor in developing the sector lists was that the Kyiv Protocol (and the E-PRTR) identify covered activities rather than covered sectors. Facilities are still identified with an industry sector code in E-PRTR data, which can be used to crosswalk to ISIC. However, keep in mind that facilities report only for the particular activity(ies) required – unlike in other PRTRs, where facilities report on releases from any activities at the facility. Additionally, E-PRTR representatives consider facility sector assignments to be less reliable than the reported activity codes, adding uncertainty to sector analysis at a more detailed level.

Be aware that there is uncertainty in cross-walking different countries' sector classification systems. Uncertainty is lower at high-level sector classifications, while attempting to use more detailed sector classification levels increases this uncertainty.

The Long Sector Reporting List serves as a reference to assess which sectors are listed in the PRTRs, while the Short Sector Reporting list serves as a resource for analysts to identify and understand which sectors that are common to the PRTRs of interest. To further facilitate analyses, OECD publishes these lists in an Excel format for easy integration into analyses.[9]

3.4. Key consideration: Differing release pathways

All PRTRs require facilities to report on-site air and water releases. However, PRTRs vary widely in what information is included about on-site land disposal, as well as off-site transfers. For example, facilities in the United States (US) report disposal to any on-site landfills, surface impoundments, underground injection wells, waste rock piles at metal mines, and any other disposal, intentional or unintentional, of a chemical to land. In the E-PRTR, only releases to soil – i.e., spills to land – are reported. As a result, reported land release quantities in E-PRTR are minimal, while in the US, land releases typically represent approximately two-thirds of all reported release quantities.

Reporting off-site transfers also varies, and some PRTRs require this reporting by chemical, while some require reporting by waste (i.e., the reported quantity may include multiple chemicals), making comparisons of off-site transfers among PRTRs with different reporting impossible.

Analytical approach to address differences in reporting by release pathway

Limiting a cross-PRTR analysis to a single medium – air or water – is the most effective way to address the differences in the reporting requirements for land disposal and off-site transfers across PRTRs. Air and water releases of pollutants are generally the most significant pathways for human health and the environmental impacts. However, comparisons of other media may be feasible between countries where land release and or/off-site transfer reporting requirements are comparable, such as between the United States and Canada.

[9] OECD (2022), *Proposal for a Harmonised List of Reporting Sectors*, "Support Materials," OECD Publishing, https://www.oecd.org/en/publications/harmonised-list-of-pollutants-for-global-pollutant-release-and-transfer-registers-prtrs_39657758-en/support-materials.html

3.5. Key consideration: Differing thresholds

Most PRTRs have chemical-specific thresholds, and many also include thresholds based on sector, activity, or employment. These thresholds vary in several ways:

- **Chemical threshold definition (use versus releases**). PRTRs differ in whether they require reporting based on the amount of a chemical handled or the amount of the chemical released. For example, in the United States, thresholds are defined by the quantity of a chemical manufactured, processed, or otherwise used. In contrast, the EU bases thresholds on the quantity of a chemical released, with different thresholds for releases to air, water, and land. Canada's thresholds vary by substance where some are based on the quantity of the chemical manufactured, processed, or otherwise used, while other substances (e.g., polycyclic aromatic compounds) are based on release thresholds.
- **Chemical threshold quantities.** Even when threshold definitions are similar, the quantities required for reporting vary among PRTRs. For instance, for vinyl chloride, Japan, Canada, Australia, and the United States all set thresholds based on usage, but the quantity used varies considerably with a 500 kg/year threshold in Japan, 10,000 kg used in Canada and Australia, and 4,540 - 11,340 kg in the United States depending on how the chemical is used. For the EU, the threshold for vinyl chloride is 1,000 kg released to air or 10 kg released to water or land.
- **Activity thresholds.** In addition to chemical thresholds, a PRTR may base thresholds on specific activities. For example, Australia's PRTR includes a threshold for reporting based on the quantity of fuel combusted.
- **Sector thresholds**. PRTRs may set production or capacity thresholds based on a facility's sector. In some cases, facilities in certain sectors are exempt from reporting if production capacity is below a specific threshold. Conversely, some PRTRs include sectors that must report regardless of usage quantities. For example, any facility in Canada that incinerates hazardous waste must report for dioxins and furans regardless of the amount of waste incinerated.
- **Employment thresholds.** Some PRTRs also set a threshold based on the number of employees at a facility. If a facility's workforce is below the threshold, the facility would not be required to report regardless of the quantities of chemicals released or used. However, there may be exceptions for certain sectors that are required to report regardless of the number of employees. Conversely, PRTRs may have an employment threshold that only applies to certain sectors. For example, in Australia, only dry cleaners with 20 or more employees report to the PRTR.

Analytical approach to address differences in thresholds

To facilitate cross-PRTR analyses, the OECD WP-PRTRs has included chemical-specific threshold information in the Harmonised List of Pollutants[10] document and its associated Excel file. Understanding the threshold differences between PRTRs is essential for realistically interpreting results. Although it is usually not possible to quantify the impact of varying thresholds, qualitative insights can sometimes be drawn, as with the example of the reporting thresholds for vinyl chloride. The most effective way to account for these differences is to focus on comparing pollutant release trends across PRTRs, rather than comparing absolute values, as thresholds are constant for each pollutant within a given PRTR.

[10] OECD (2022), *Harmonised List of Pollutants for Global Pollutant Release and Transfer Registers (PRTRs)*, OECD Series on Prevention and Control of Pollutant Releases, OECD Publishing, Paris, https://doi.org/10.1787/39657758-en.

3.6. Key consideration: Differing economic activity

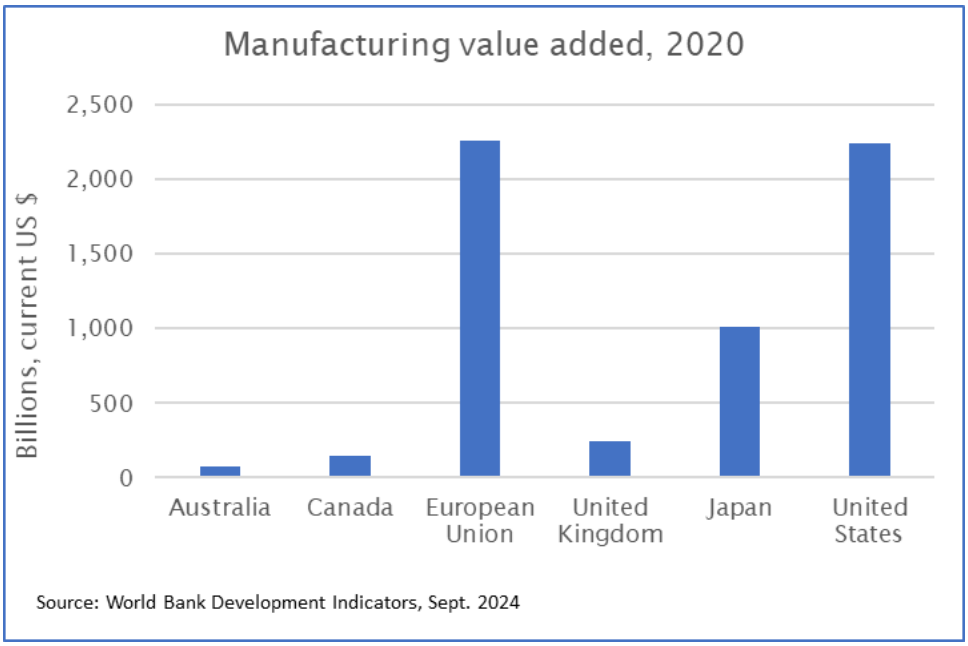
Often the significant driver of differing quantities of releases between PRTRs is the size and composition of the country's economy. The level and types of industrial activity vary significantly across countries with PRTRs. The differences are evident in the different number of facilities reporting to each PRTR; however, facility counts alone do not provide insights into production levels at these facilities. Ideally, there would be facility-level information available on production levels which would allow analysts to compare releases per unit of production among PRTRs. However, such data are rarely reported to a PRTR and if they are, the information is not likely to be publicly available as it may constitute confidential business information.

Analytical approach to address differences in economic activity

To control for differences in economic activity, analysts may choose to "normalise" the data. Normalising the data accounts for differences in economic activity by converting the mass of releases (e.g., in kg) to releases per unit of production (e.g., kg per automobile produced). Since facility level production data are rarely publicly available, analysts turn to proxy metrics instead. One such proxy metric is the World Bank's data on value added by the manufacturing sector for each country, as shown in Figure 3.1.

While the manufacturing value added data is one of the best available metrics for normalising PRTR data, it has limitations. It reflects all manufacturing activity within a country, however not all manufacturing facilities report to a country's PRTR. For example, in the United States, approximately 20,000 manufacturing facilities submit PRTR data annually, while other data sources indicate that there are roughly 400,000 manufacturing facilities in the country in total - many of which do not meet the PRTR reporting criteria. However, all of them are included in the country's manufacturing value-added statistics. Despite this limitation, the presumption is that this discrepancy is relatively consistent across countries, reducing its overall impact on normalised cross-country comparisons.

Figure 3.1. Manufacturing value added for several countries/regions with a PRTR



3.7. Key consideration: Differing timeframe for data available

Selecting a timeframe for an analysis involves several factors. For a trend analysis, analysts must consider the years of available data for the PRTRs of interest. Additionally, the number of years included should align with the research question posed, as this will largely determine the appropriate timeframe.

Analytical approach to setting a timeframe for analysis

PRTRs have been developed and implemented around the world since the 1980s, with more countries adopting them each year. Since countries introduce PRTR requirements at different times, analysts must account for the varying availability of data across years. To include newer PRTRs in an analysis, it may be necessary to focus on a shorter time span so that years of available data are consistent across all PRTRs.

When analysing European PRTR data, keep in mind that additional countries' data have been added to the E-PRTR database over time. Therefore, the more recently added countries may not be included in all years of PRTR data. UK data are included in E-PRTR prior to 2020 but are not included subsequent years[11].

While some analyses view the most recent year of data common to the PRTRs of interest, it's important to consider that pollutant release quantities can vary significantly from one year to the next. The variability may be due to changes in reporting from just one or a few facilities (e.g., a facility closing or expanding production) or may be impacted by facilities that are near reporting thresholds, so they report releases some years but not others. Designing an analysis to include multiple years of data rather than a single year is expected to be more representative of actual releases. It is also important to consider that when a facility drops below a reporting threshold for a substance, it does not mean there are no releases or waste transfers.

3.8. Key consideration: Differing units and language

Providing public access to pollutant release and transfer information is a core objective of PRTRs, so the data are published in the language and units of the respective country. Analyses involving multiple PRTRs require standardisation of both units and language.

Analytical approach to standardising units and language

When accessing PRTR data from a country's website, the files may be available only in the local units and language, requiring analysts to convert to data into standardised format. However, OECD's Centre for PRTR Data [12] simplifies this process by providing PRTR data files in English and with quantities standardised to kilograms.

[11] Except Northern Ireland, which continues to be included in the E-PRTR. Northern Ireland represents a very small fraction of all UK PRTR-reporting facilities.

[12] https://www.oecd.org/en/topics/monitoring-and-preventing-industrial-pollution.html

4. Interpreting results

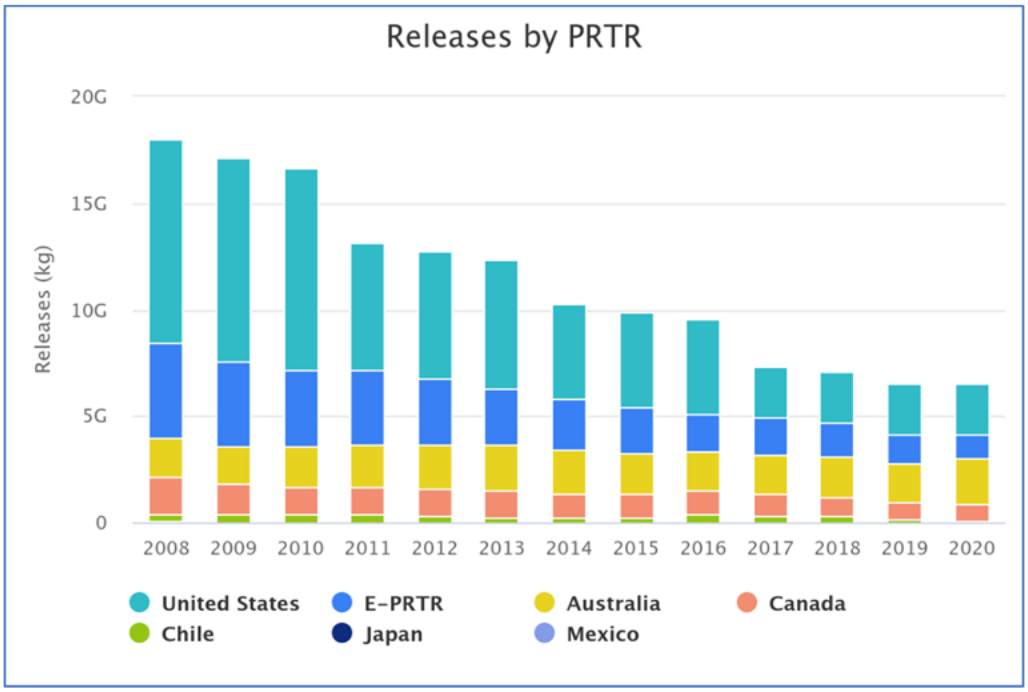
To illustrate the application of the approaches described in Section 3, this section presents a series of example analyses and provides guidance on how to interpret the results.

4.1. Analysis example 1: High-level trends

Purpose. The purpose of Example 1 is to examine high-level trends in pollutant releases to air and water across multiple PRTRs.

Analysis. This example uses data from the OECD's PRTR data explorer. It includes seven PRTRs and 14 chemicals[13] of interest. Only releases to air and water are included because these are reported consistently across PRTRs. Land releases and off-site releases are not included because the PRTRs in the analysis include different levels of reporting for these types of releases. For example, the United States includes any on-site landfill disposal as land releases, while facilities report only direct releases to soil in E-PRTR.

Figure 4.1. Air and water releases of 14 pollutants by 7 PRTRs

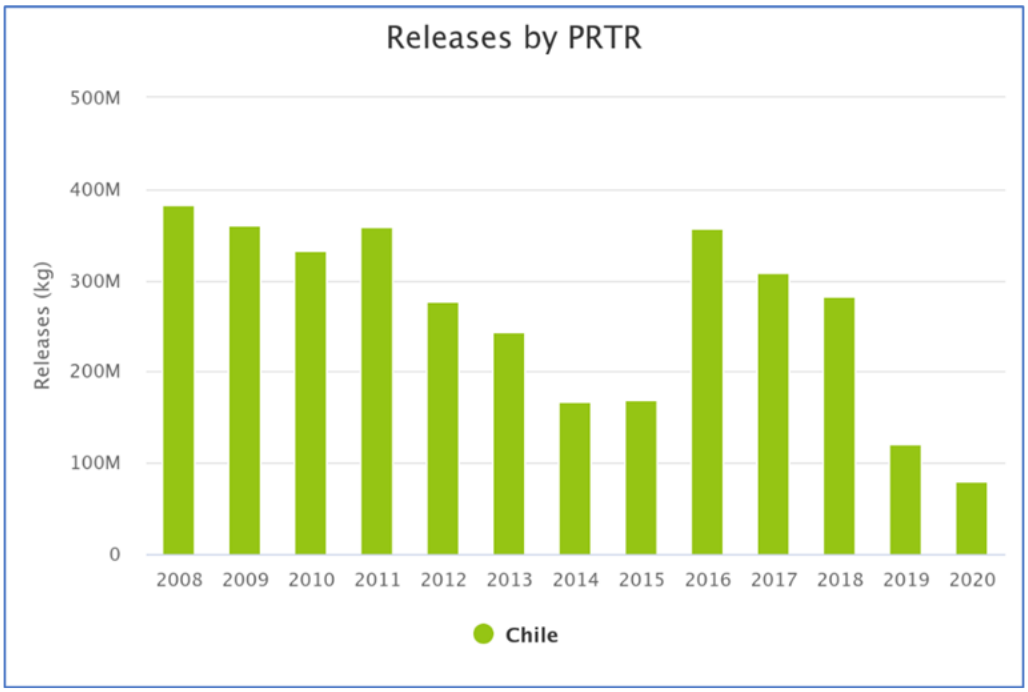


There are several types of analyses and interpretations that can be performed at this level:

[13] Seven PRTRs and 25 pollutants as of April 2026.

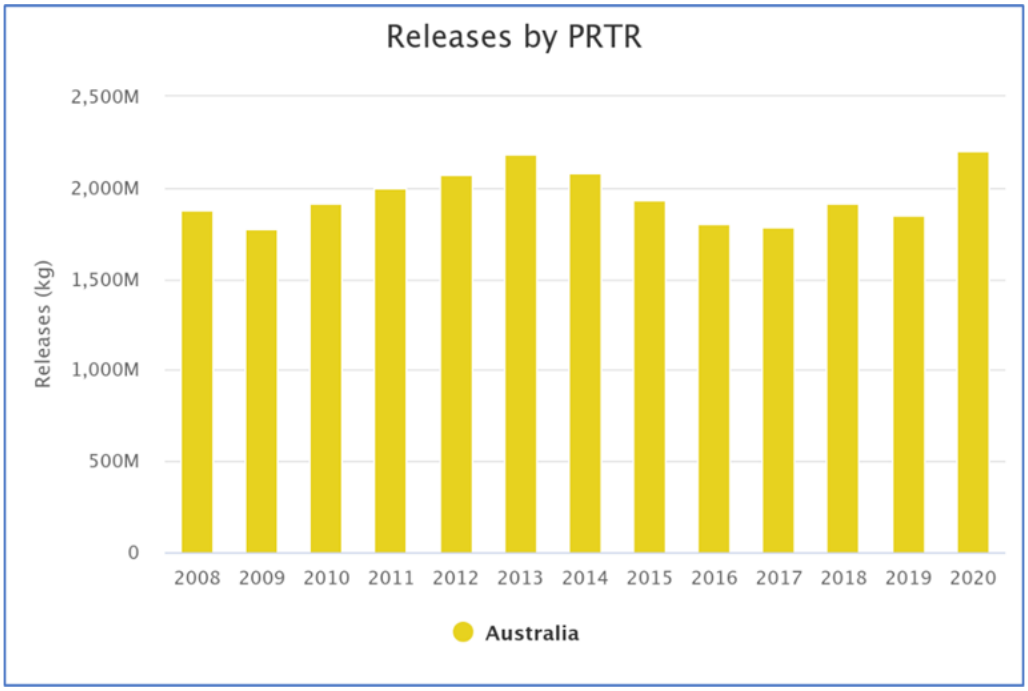
- **Overall trends**. The first interpretation is to examine the overall trend shown in Figure 4.1. Here, the trend is decreasing overall. It is worth looking more closely to understand the cause of the trend.
- **Trends by PRTR**. Analysts can look at the trends by PRTR and see that releases have decreased in the United States and E-PRTR, but trends for other countries are not clearly visible. Zooming in to look at individual PRTRs shows, for example, a recent decrease in releases in Chile (Figure 4.2) and fluctuations in releases in Australia (Figure 4.3). When there are certain PRTRs that don't follow the overall pattern, or that seem to drive overall trends, it is often worth a deeper examination of why that is happening.

Figure 4.2. Air and water releases of 14 pollutants in Chile



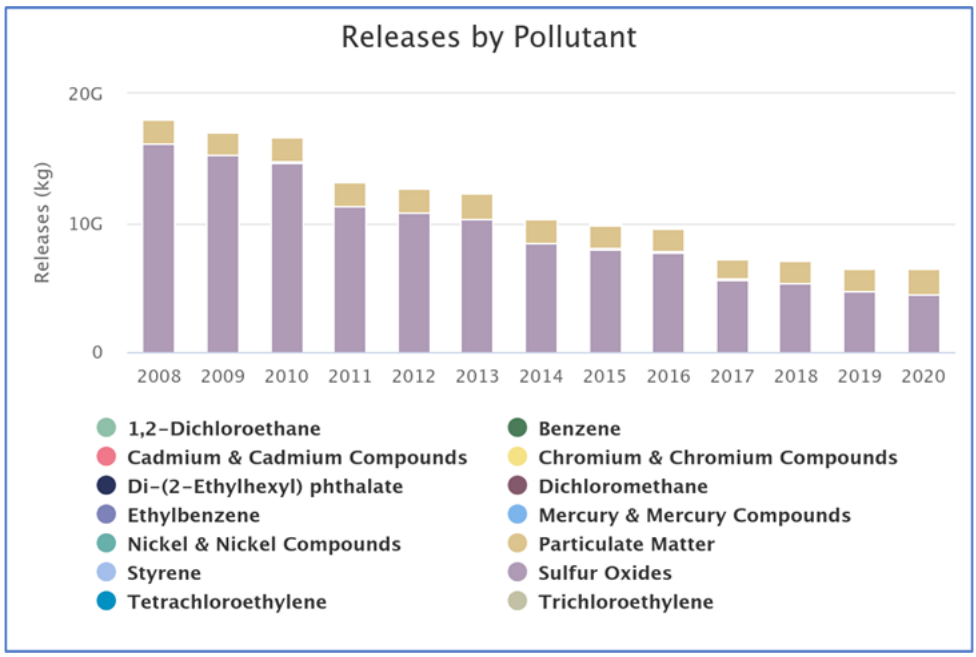
Unclassified

Figure 4.3. Air and water releases of 14 pollutants in Australia



- **Trends by chemical**. Based on Figure 4.1 alone, an analyst might conclude that historically, facilities in the United States have had the most releases of these countries but have since had dramatic decreases in releases. However, this is not the full picture. To interpret Figure 4.2, also view the trends by chemical (Figure 4.4). Figure 4.4 shows that releases are dominated by sulphur oxides; about 85% of the releases in the chart are of sulphur oxides. Another 13% are releases of particulate matter. Indeed, in Figure 4.4, sulphur oxides and particulate matter are the only visible pollutants. However, referring to the Long List of Harmonised Pollutants, one can see that sulphur oxides and particulate matter are not reported to the PRTRs of Japan and Mexico, and in the United States, they are reported differently (and collected through a system other than the PRTR) than the other pollutants. Data on these pollutants is only collected every three years in the United States, adding uncertainty to annual trend analyses for the interim years, where data are extrapolated. The Long List of Harmonised Pollutants also shows that definitions of "particulate matter" differ by country and the definition of particulate matter is more inclusive in the United States than some other PRTRs.
- **Interpretation summary**. From the types of analysis described at this level, analysts can draw conclusions about an overall downward trend in releases while also identifying key areas for closer analysis. In this example, releases of sulphur oxides in these countries have decreased considerably, driving overall trends. Additionally, trends are inconsistent between countries. The goals of the analysis will help guide what to look at next. For example, analysts who are interested in assessing countries' progress in reducing pollution would examine the trends in releases excluding sulphur oxides and particulate matter. This gives a better basis of comparison between PRTRs and will highlight changes in releases beyond those two pollutants.

Figure 4.4. Air and water releases by pollutant for 7 PRTRs

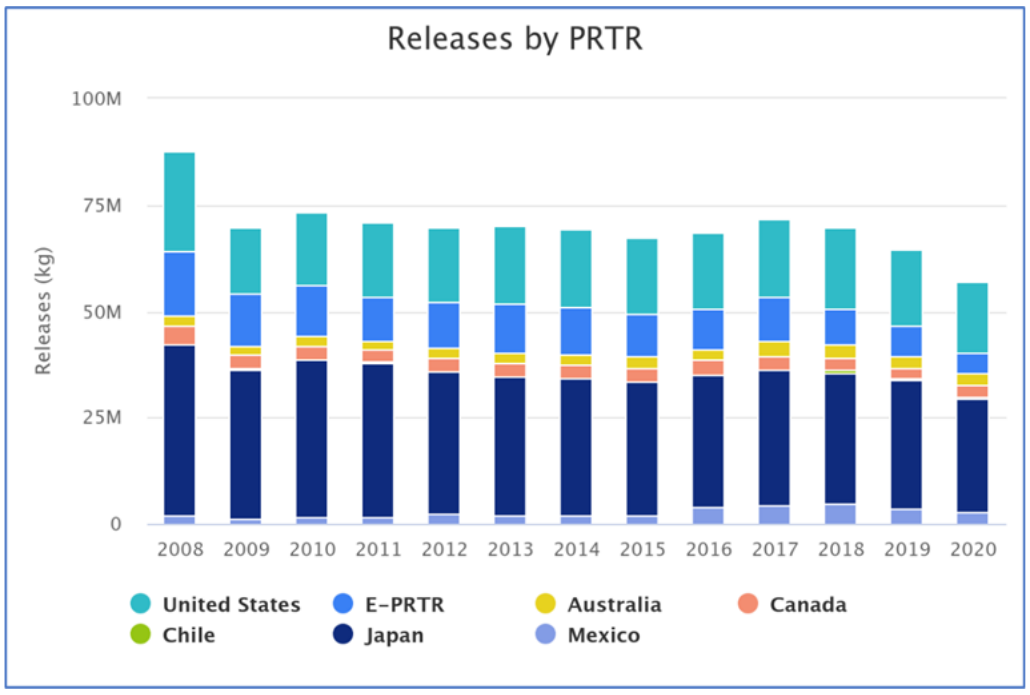


4.2. Analysis example 2: Narrowing the chemical focus

Purpose. When the results of a multi-chemical analysis are dominated by one or two chemicals, those chemicals mask the trends of other chemicals, as was shown in Example 1. The purpose of the Example 2 analysis is to understand the release trends for the non-dominant chemicals from the Example 1 analysis.

Analysis. Figure 4.5 shows the same data as Figure 4.1, but excludes sulphur oxides and particulate matter. It is limited to 12 pollutants with more consistent reporting across PRTRs, although not all of the included pollutants are reported to all seven included PRTRs. This example uses data from the OECD's PRTR data explorer.

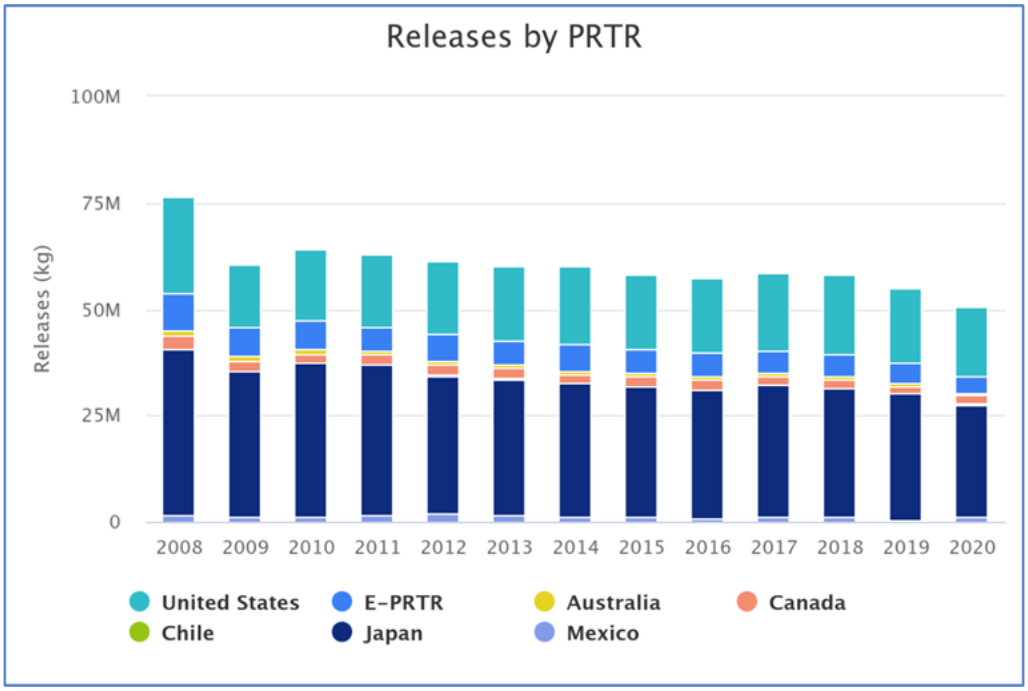
Figure 4.5. Air and water releases of 12 pollutants for 7 PRTRs



- **Overall trends**. The overall trend presented in Figure 6 shows a decrease in reported releases over time, but the change primarily occurs at two points – from 2008 to 2009 and from 2018 through 2020. To analyse what is driving those declines, consider whether known events, data issues, or PRTR requirements changes could explain the trends. For example, the global financial crisis of 2008 and the Covid-19 pandemic could have driven some of these changes. Any sudden changes in releases without an obvious explanation merit further examination, as they could be artifacts of changes or issues in the PRTR data, rather than actual changes in releases.
    - Interpret recent trends with caution. For example, countries are sometimes late to report and be incorporated into the E-PRTR dataset. Further, as a result of the United Kingdom (UK)'s withdrawal from the EU, data from the UK are not included in the E-PRTR dataset from 2020 onward[14]. Recent years of data can sometimes (though rarely) also have notable changes in reported releases due to facilities submitting revisions or late submittals, so it is better to review a longer-term trend, especially if economic or other known conditions do not explain the change.
- **Trends by sector**. To further understand the results, look at releases by sector. Keep in mind that there are important differences in what sectors or industrial activities are covered by the different PRTRs. Figure 4.6 shows the same data as Figure 4.5 but limited to manufacturing facilities only. As the data examined are limited to improve the consistency among PRTRs in the analysis, conclusions can be drawn with higher confidence.

[14] Northern Ireland is still included in the E-PRTR but includes very few facilities and releases.

Figure 4.6. Air and water releases of 12 pollutants from manufacturing facilities



- **Trends by PRTR.** By limiting the data to manufacturing facilities, data are more comparable across PRTRs. As described in Section 3, different pollutants are included in each PRTR (check the OECD harmonised pollutant list for details), so it is not recommended to make direct comparisons of absolute releases between countries. However, since requirements within a PRTR are consistent and Figure 4.6 includes a comparable group of included sectors and pollutants, changes within PRTRs are expected to be comparable. For instance, analysts can look at the percent change in releases for Figure 4.6 by country as shown in Table 4.1.

Table 4.1. Change in air and water releases of 12 pollutants from manufacturing sector facilities

	United States	E-PRTR	Australia	Canada	Chile	Japan	Mexico
Change, 2008 - 2020	-27%	-57%	-57%	-39%	+136%	-33%	-7%
Change, 2009-2019	+20%	-30%	-54%	-14%	-27%	-14%	-49%

  - **Consider the timeframe**. Endpoint-to-endpoint analyses can be misleading, since one-time events or reporting errors can have an outsize impact. Choice of endpoints can also reflect the priorities of an analysis – to view long-term changes, pick the earliest possible start year and latest end year. To better understand recent trends, pick a later start year. As mentioned above, consider the potential for external events to impact the observed trends when selecting a timeframe for the analysis. Figure 4.6 shows a noticeable decline in 2009, which may be a result of the global financial crisis. An endpoint-to-endpoint analysis that uses 2009 as a base year may show increase to subsequent years that would not be the case if a 2008 starting point were selected. Methods like regression analysis can reduce the impact of endpoint choice but the results may be more complicated to explain to an audience.

- **Consider the release media**. Confounding factors in the Table 2 example analysis could be further reduced by limiting the analysis to a single medium – either air or water – rather than combining air and water.

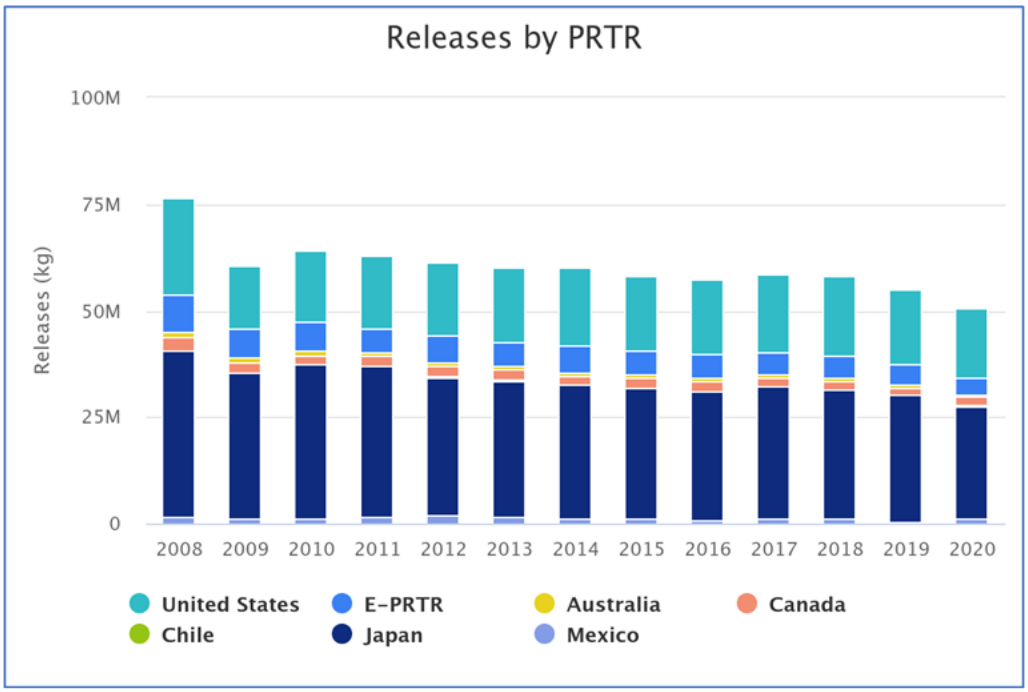
- **Interpretation summary.** Looking at both overall release trends and country-level relative changes reduces the uncertainty in the conclusions drawn. For instance, for this analysis the analyst might conclude that generally, these countries have made progress in reducing their emissions of these pollutants. Progress has been inconsistent in the United States and Chile, but decreased releases in Japan have driven an overall decreasing trend. Although Australia is a minor contributor to the global trend in terms of absolute release quantities, consistent decreases in releases there could indicate successful pollution reduction efforts that could be a model for other countries.

4.3. Analysis example 3: Considering chemical toxicity

Purpose. In addition to examining trends in the mass (kilograms) of releases, analysts may be interested in considering the relative toxicity of each chemical released. This level of detail can be useful in prioritising pollutants for pollution reduction interventions.

Analysis. OECD's PRTR data explorer allows users to output results based on several metrics: kilograms, human (cancer) toxicity-weighted releases, human (non-cancer) toxicity-weighted releases, or ecotoxicity-weighted releases. This example builds on the criteria selected for Example 2 (i.e., air and water releases of 12 pollutants by facilities in a manufacturing sector for seven PRTRs) to consider chemical toxicity. Figure 4.7 is the same as Figure 4.6, showing results by mass (i.e., in kilograms).

Figure 4.7. Air and water releases of 12 pollutants from manufacturing sector facilities

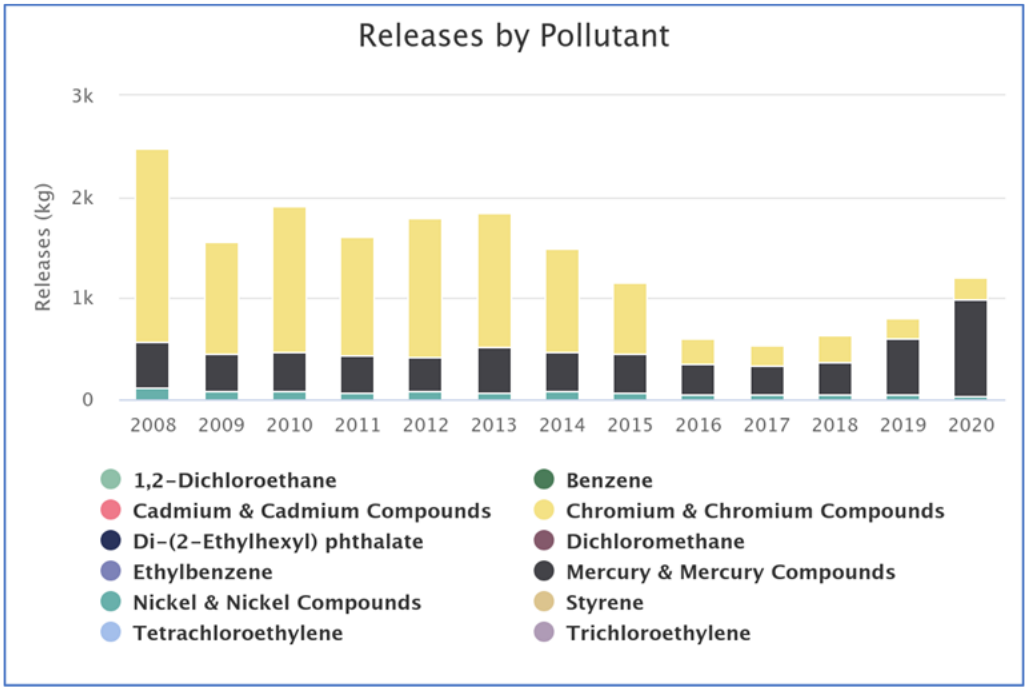


- **Consider toxicity**. Outputting the Figure 4.7 results but instead of displaying results in kilograms released, Figure 4.8 shows the results when based on human cancer toxicity-weighted releases. The figure shows that releases of mercury and chromium drive human cancer impacts among the

12 pollutants included in Figure 4.6. Toxicity impact scores are a way of estimating the potential for harm to humans and the environment posed by pollutant releases. To calculate toxicity impact scores for each pollutant, OECD's PRTR data explorer multiplies a pollutant-specific characterisation factor from USEtox[15] by the relevant release quantity from each PRTR in the analysis. For each pollutant, USEtox provides separate characterisation factors for cancer and non-cancer impacts (for humans), and freshwater ecotoxicity impacts (for the environment).

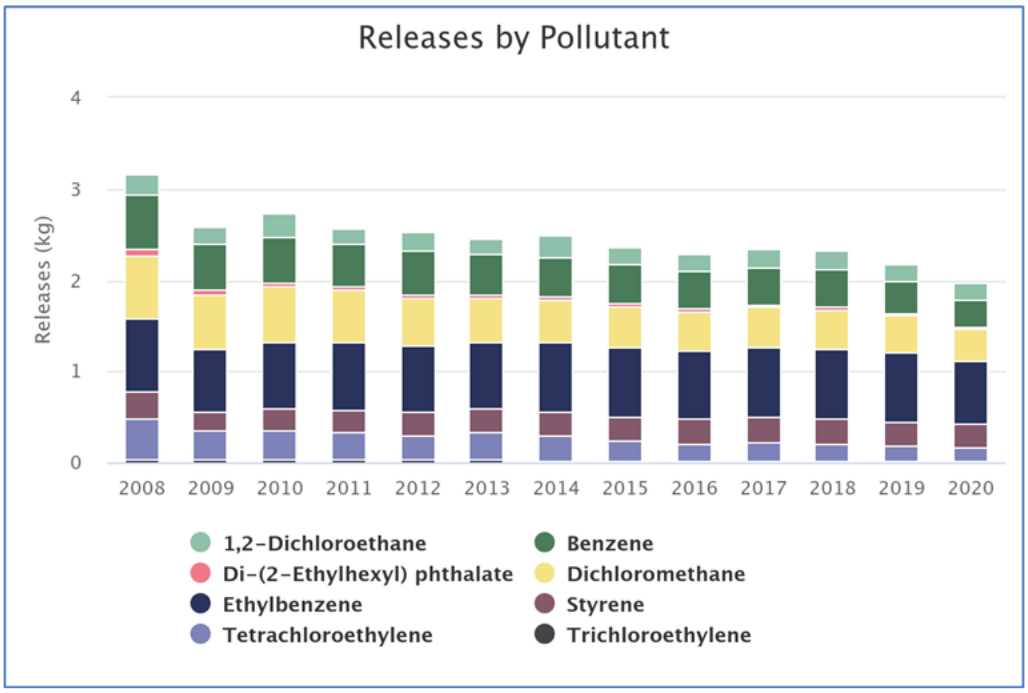
- **Be aware of toxicity factor limitations**. USEtox toxicity factors have high uncertainty for metals, so it is also worth examining the trend excluding the metals, as shown in Figure 4.9.

Figure 4.8. Cancer toxicity-weighted air and water releases of 12 pollutants from manufacturing facilities in 7 PRTRs



[15] USEtox, https://usetox.org/.

Figure 4.9. Cancer toxicity-weighted air and water releases of 8 organics from manufacturing sector facilities in 7 PRTRs



4.4. Analysis example 4: Analysing a specific chemical

Purpose. The purpose of Example 4 is to limit the data to analyse releases of a single pollutant or a small subset of pollutants across PRTRs.

Analysis. Narrowing in on one or a small number of pollutants is useful for several reasons:

- It removes the variation among countries based on each PRTR's pollutant list that can confound results when an analysis uses all pollutants from each PRTR.
- Differences in chemical listings (for example, if only certain forms of a chemical are included on one PRTR) can be better accounted for when looking at one or a small subset of pollutants.
- It provides a better dataset for understanding impacts of regulatory or other activities. For example, if a country implemented new restrictions on the use of a chemical or undertook other pollution reduction interventions, changes in releases of the chemical in that PRTR can be compared to changes in releases of the chemical in other PRTRs that did not implement the restriction or intervention.

Example 4 is based on an example from the OECD report, Using Pollutant Release and Transfer Register (PRTR) Information to Evaluate Progress Towards the United Nations' Sustainable Development Goal 12.[16] This examples focuses on ethylbenzene releases to air and water from facilities in manufacturing sectors in five PRTRs.

[16] The OECD report *Using Pollutant Release and Transfer Register (PRTR) Information to Evaluate Progress Towards the United Nations' Sustainable Development Goal 12* includes in-depth analyses of 14 individual pollutants as well as broader trends and may be a helpful resource for analysts looking for examples of this type of work.

Figure 4.10. Air and water releases of ethylbenzene from manufacturing sector facilities in 5 PRTRs

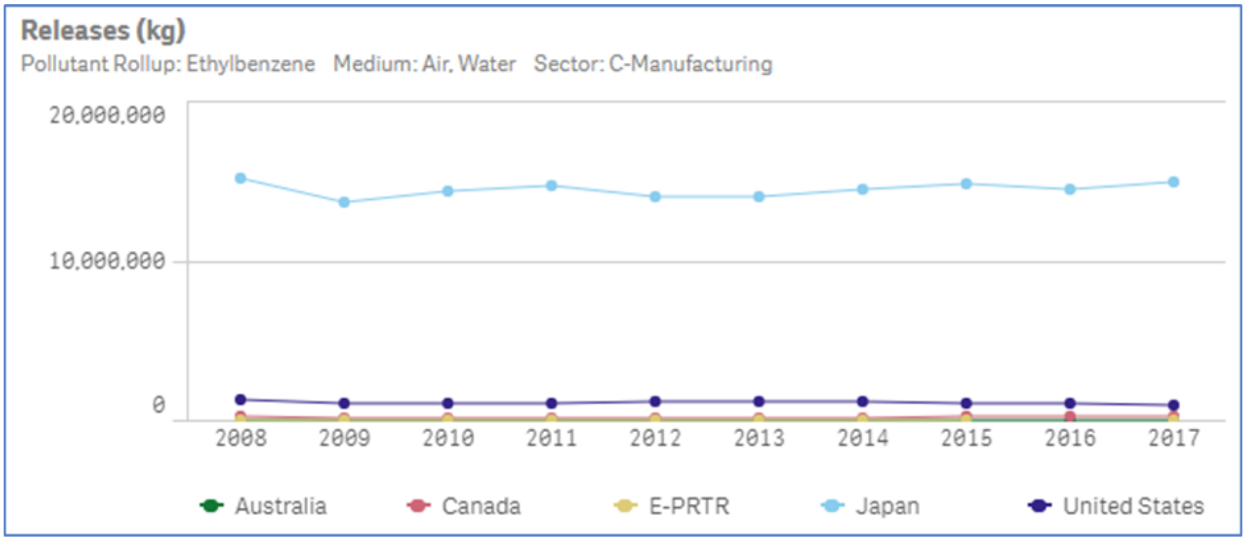


Figure 4.10 shows that among the five PRTRs that report ethylbenzene, Japan reports the most releases of ethylbenzene. As noted in Section 3, different PRTRs have different reporting thresholds, which can be found in the OECD's Harmonised List of Pollutants. This list shows that reporting thresholds for ethylbenzene are lower in Japan (facilities report if they handled 1,000 kg) compared to other PRTRs (the highest threshold for ethylbenzene among the PRTRs in Figure 4.10 is in the United States, where the threshold is 11,340 kg manufactured or processed). To determine whether this threshold difference was the cause of the difference in reported releases, examine facility-level reporting from Japan including only facilities that released at least 11,340 kg of ethylbenzene (i.e., releases large enough that a facility would have to report in any of the five PRTRs). Even when including only releases of at least 11,340 kg, ethylbenzene releases in Japan are more than the other four PRTRs combined, indicating that threshold differences are not the only cause of the higher releases observed for Japan.

The sectors with the greatest releases of ethylbenzene in Japan's PRTR were ISIC 30 (other transportation equipment, which includes subsectors such as shipbuilding, manufacture of military vehicles, and manufacture of railway locomotives and rolling stock) and ISIC 29 (motor vehicle and trailer manufacturing). Ethylbenzene is released almost exclusively to air, with almost no releases to water reported.

The overview analysis in the OECD report analysed a total of 14 pollutants, and at that level found releases across the five PRTRs in Figure 4.7 to be decreasing. However, looking at ethylbenzene alone shows no significant trend in releases, illustrating the value of a closer look at individual pollutants. It could be that ethylbenzene does not follow the same trends as other pollutants because it's primarily used in different industries or for different purposes than the other pollutants studied.

4.5. Analysis example 5: Analysing global trends in context

Purpose. Even after accounting for the inherent differences among PRTRs as discussed in the previous examples, it is challenging to compare the pollutant release quantities between PRTRs due to differences in country size, manufacturing activity, and economic activity in each region. The purpose of Example 5 is

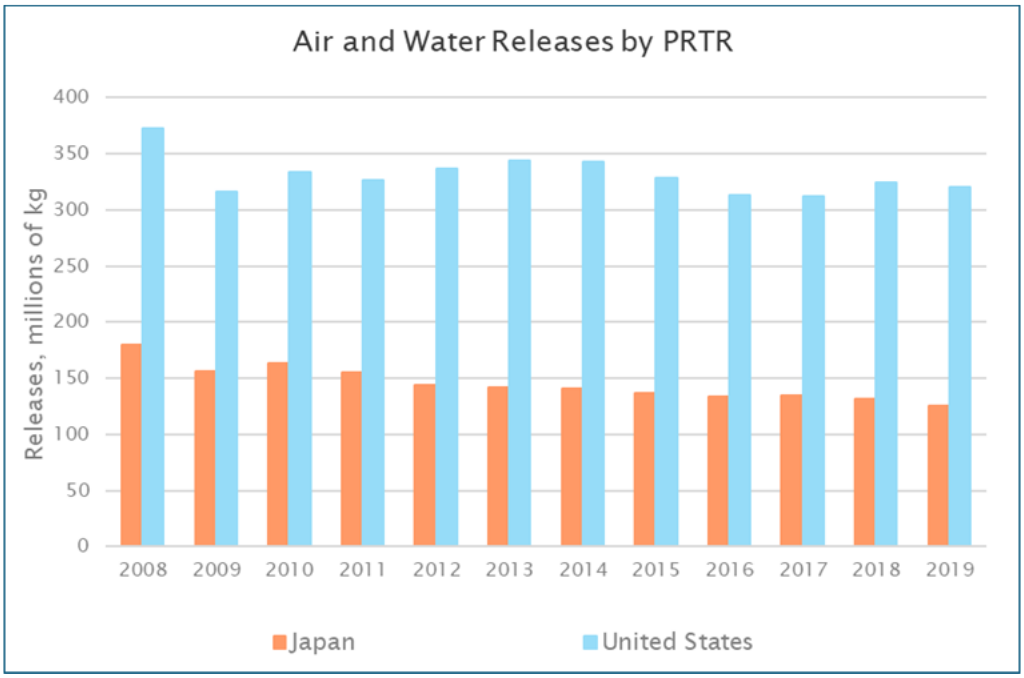
to examine trends in pollutant releases between two PRTRs and to account for differences in the countries' economies.

Analysis. To account for differences in the countries' economies, the PRTR pollutant releases data can be normalised each country's economic activity, as represented by manufacturing value added. Manufacturing value added calculates the value that manufacturing sectors add to a country's economy. This example uses data from the OECD's Centre for PRTR Data and the World Bank Group's World Development Indicators. The Centre for PRTR Data was used in this example because it includes all pollutants reported to each PRTR, rather than the subset of pollutants currently in OECD's PRTR data explorer.

For this example, Figure 4.11 includes air and water releases from all pollutants reported by Japan and the United States PRTRs from 2008 to 2019, limited to facilities in manufacturing sectors.

- Figure 4.11 shows the pollutant releases to air and water for all pollutants reported to Japan and the United States's PRTRs from 2008 to 2019. The data are limited to manufacturing sectors to better align with the manufacturing value added metric that will be used for normalisation.

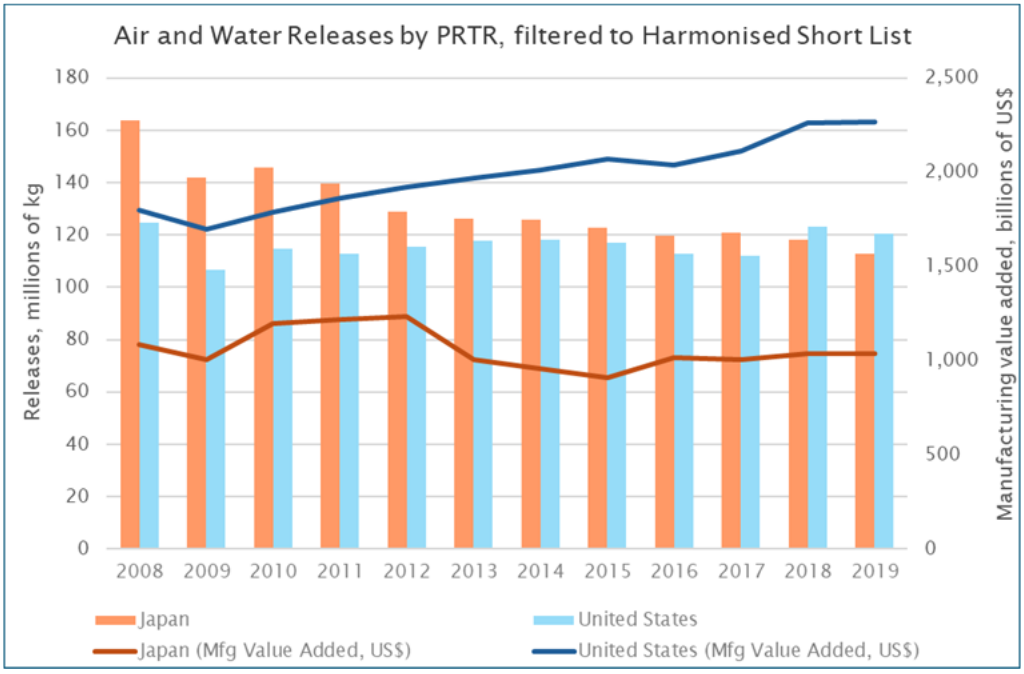
Figure 4.11. Air and water releases from manufacturing sector facilities in Japan and the United States



- **Consider reportable pollutants**. This example includes data from Japan and the United States, whose PRTRs each included for over 500 different pollutants for the years displayed in Figure 4.11. The figure shows that the United States released over twice the quantity of pollutants to air and water as Japan during these years. However, not all pollutants were reported by both PRTRs. For example, over 80% of releases to water in the United States are from nitrate compounds, which are not reported to the Japanese PRTR. The releases of nitrate compounds alone account for over one billion kg of releases reported by the United States from 2008 to 2019, contributing to the significant difference in release quantities between PRTRs shown in this figure. When comparing trends among PRTRs, check the OECD's Harmonised List of Pollutants to understand which pollutants were reportable to each PRTR during the time frame of interest.

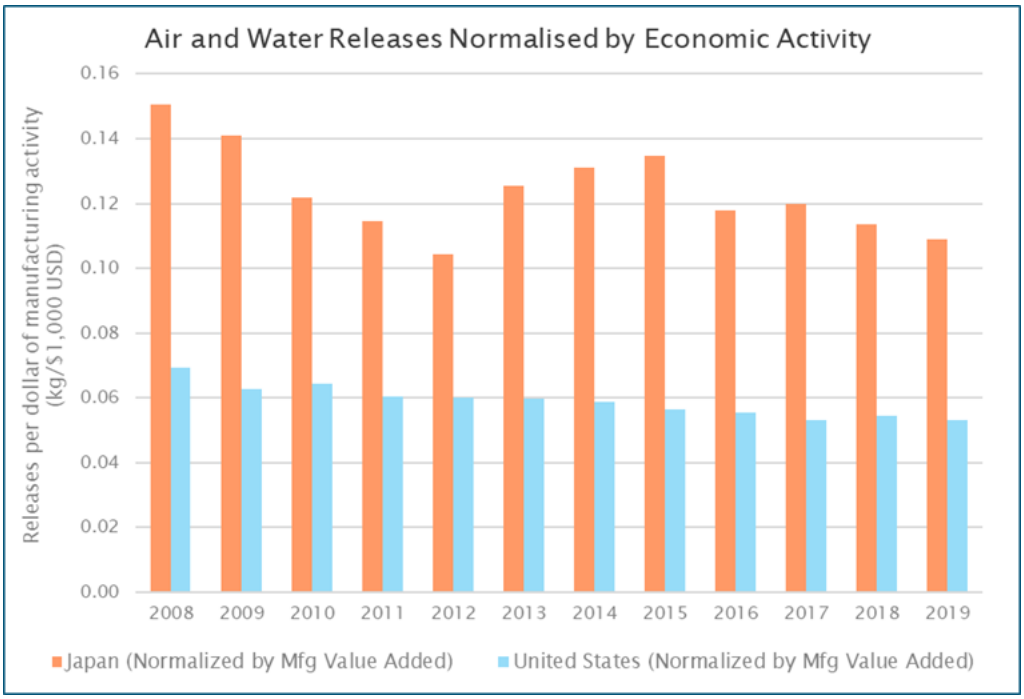
- Figure 4.12 shows the same data as shown in Figure 4.11 but limited to chemicals on the Harmonised List of Pollutants. Note that the quantities of pollutants released from each PRTR are similar now that the data are limited to a smaller subset of pollutants that are reported by both PRTRs. This removes some of the variation between countries, however, Japan's lower thresholds for some pollutants are expected to influence these results.

Figure 4.12. Air and water releases from manufacturing sector facilities in Japan and the United States, limited to chemicals on the Short List of Harmonised Pollutants



- **Consider economic activity.** The lines in Figure 4.12 show the manufacturing value added for Japan and the United States as an indicator of economic activity. Notice that while both countries reported similar ranges in releases over the same time frame shown, their economic activity differed; manufacturing value added in the United States is higher than Japan's manufacturing value added from 2008 to 2019. The United States also saw a greater increase in economic activity than Japan over the time period presented.

Figure 4.13. Air and water releases from manufacturing sector facilities limited to chemicals on the Short List of Harmonised Pollutants and normalised by manufacturing value added



- Figure 4.13 divides the releases from each PRTR in Figure 4.12 by each country's annual manufacturing value added to show manufacturing sector releases per thousand dollars of manufacturing value added. This normalises the releases to enable a better comparison of the release trend while accounting somewhat for differences between the countries' economic activity. While manufacturing value added is the best available metric for this level of economic normalisation, it is still a proxy for normalisation in that it includes activity associated with all manufacturing activity in the country and is not limited to only those facilities that report to the PRTR.
- Figure 4.13 shows that when accounting for economic activity, Japan released higher quantities of pollutants per dollar of manufacturing activity as compared to the United States. The figure also shows that releases of pollutants normalised by economic activity have varied significantly in Japan, while in the United States the ratio of pollutant releases to economic activity has stayed relatively consistent between 2008 and 2019.
- To further investigate the differences between the two countries, an analyst would examine which pollutants are driving the trend in Japan and compare the reporting requirements for those pollutants in Japan versus the United States. For example, lower reporting thresholds in Japan could be a driver of the differences between Japan and the United States seen in Figure 4.13.

5. Next steps

As noted throughout this document, conducting global or multi-country analyses of PRTR data poses challenges because of differences in national reporting requirements. To support the growing need for global analyses, the following next steps are recommended:

- Countries can contribute to strengthening international analyses by improving the harmonisation of their PRTR data with other PRTR systems when modifying existing PRTRs or designing new ones.
- Analysts should account for differences among PRTRs when interpreting results, as illustrated in the examples provided in this document. Doing so helps ensure analyses remain meaningful and comparable.
- While Section 4 presents several examples, the OECD WP-PRTRs welcomes additional examples, case studies or analyses that make use of PRTR data in a global context. Users of the document are encouraged to submit comments, corrections, updates and new information to the OECD Environment, Health and Safety Division (ehs.contact@oecd.org). Comments received will be forwarded to the WP-PRTRs, which will consider them so that the document can be updated accordingly.