



Scoping Study on Releases from Products with a Pro- posal of the Next Steps

Scoping Study on Releases from Products with a Proposal of the Next Steps

TemaNord 2006:597

© Nordic Council of Ministers, Copenhagen 2006

ISBN 978-92-893-1446-6

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Preface

A Pollutant Release and Transfer Register (PRTR) is an environmental database or inventory of potentially harmful chemicals and/or pollutants released to air, water and soil, and transferred off-site for treatment. A PRTR brings together in one place information about what pollutants are being released, how much and by whom. According to the OECD Council Recommendation [C(96)41/FINAL], as amended by [C(2003)87], the core elements of a PRTR system are:

- A listing of chemicals, groups of chemicals and other relevant pollutants that is released to the environment or transferred off-site;
- Integrated multi-media reporting of releases and transfers (to air, water and land);
- Reporting by source, covering point sources and non-point sources, where appropriate;
- Periodic reporting (preferably annually); and
- Making data available to the public.

The overall objective of the Scoping study on Releases from Products was to collect information on the present status of estimating releases from products and the used techniques, as well as on priority products and substances included in PRTRs in OECD member countries.

The project was carried out in two phases:

- Phase 1: Information gathering and status description; and
- Phase 2: Strategies for inclusion of releases from products in PRTRs.

Between the two phases a workshop was organized on the scope and content of the project among the Nordic PRTR Group and representatives of the consultant.

The study has been followed by a Steering Group consisting of the following members:

- Trine Berntzen, The Norwegian Pollution Control Authority, Norway (Chair);
- Anette Christiansen, Danish Environmental Protection Agency, Denmark;
- Kristina Saarinen, Finnish Environment Institute, Finland; and
- Helene Lager, Swedish Environmental Agency, Sweden.

The following team from the consultant, COWI A/S, has been involved in this assignment: Astri Huse (Project Manager), Elin Økstad, Carsten Lassen and Erik Hansen.

Executive Summary

Objective of the Project

The overall objective of this project was to establish a basis for possible future inclusion of information on releases from products in PRTRs. The study presents information on the following areas:

- Current status on reporting of releases from products in OECD member countries;
- Data sources releases from products;
- Existing release estimates techniques (RET) for products; and
- Proposal for a way forward for OECD to support their member countries.

Used Methodology

To establish a status of product information in the existing PRTRs, questionnaires were submitted to environmental authorities in OECD member countries. The project also included a literature survey of available information on releases from products in use phase.

Status of Releases from Products in PRTRs

Examples given in this report show that for many pollutants, releases from products account for a large part. Hence, it would be important to work towards the inclusion of these releases in the PRTRs. The use of PRTRs as a basis for environmental decision and policy making would be limited if they only contain information on point sources and area sources, accounting thus only for a part of the total releases of a pollutant.

Some countries currently include releases from the use phase of products in their PRTRs. The PRTRs in these countries are not complete regarding various products and emissions, since these registers provide only to a limited degree spatial disaggregation of the information. However, they do demonstrate that it is possible to include such emissions in the PRTRs.

Data Sources

Extensive work has been carried out in the EU and OECD member countries regarding the environmental characteristics of products. The legislation on the content of hazardous substances in products is rapidly developing and a lot of information exists on the amounts of these substances in products. The OECD emission scenario documents, as well as information on the emission rates of some substances from products, are avail-

able. However, much of this information is not directly applicable for the estimations of releases from products, but will have to be worked out and adapted for this purpose.

Recommendations

Widely agreed guidelines for product related release estimation techniques could encourage more countries to include releases from products in their PRTRs. Such guidelines should take into account possible differences between countries and regions regarding the product composition, and how they are used and disposed of. The guidelines should also be transparent in relation to input data and the used estimation techniques. The differences between countries and regions however are not presumed to be so fundamental that they would entirely hinder the establishment of common guidelines. The recommended pilot studies would provide a good start for the development of such guidelines.

1. Introduction

1.1 Background

Estimation of releases from products has been identified as a challenging and thus far poorly known area. Based on the general support and guidance of the 36th Joint Meeting, a Scoping Study on Releases from Products was included in the 2005–2008 work programme of the OECD Task Force on Pollutant Release and Transfer Registers (PRTRs). During the first phase of the project the scope was to justify this work and collect the existing information. The collected detailed information has been presented to the Task Force on PRTRs, but is not included in this report. The purpose of the second phase was to analyse strategies for the inclusion of releases from products in PRTRs. This report summarises the outcome of both phases. The project was funded by the Nordic Council of Ministers and managed by the Nordic PRTR Group.

1.2 Scope of the Project

The overall objective of this project was to establish a basis for the possible future inclusion of information on releases from products in PRTRs. The study presents information on the following areas:

- The present status of reporting of releases from products in OECD member countries;
- Sources regarding releases from products;
- Release estimates techniques (RET) for products; and
- Proposal for a way forward for OECD to support its member countries.

As the current project is a pilot effort in working with releases from products, this study does not yet provide detailed information on how to estimate and report releases from products.

2. Releases from products

2.1 Definition of the Term “Product”

In this project, the main focus was on the *use phase* of products. The term “products” in this project refers to *end-products* that are used by a number of users in a widespread geographical area. Examples of such end-products are detergents, paints, adhesives, textiles, kitchen equipments, medicines, cars and computers. Products may be used by enterprises, by governments, by citizens, and they may have a short or a long lifetime. Some products may be intermediate products or a part of an end-product. Examples of such are packages and batteries. These products will most often be a part of the end-product, and are included in the definition of “products” because they exhibit the same kind of properties as end-products.

Raw materials and intermediates used solely as input in industrial production processes are not accounted for as “products” in this setting because emissions from them are already accounted for in other emission reporting systems, such as in the emissions reported to the UN Framework Convention on Climate Change and the UNECE Convention on Long-Range Transboundary Air Pollution. The said also refers to petroleum products used for energy production and transport activities which are already included in the OECD definitions of point sources and mobile sources.

2.2 The use Phase in the Life-cycle of Products

In the life cycle analysis, the following main phases are often applied:

- Raw material production – for products this phase is already accounted in the PRTRs;
- Manufacturing of products – for products this phase is already accounted in the PRTRs;
- Use of products – this phase is accounted only partly in a few PRTRs; and
- Waste management – the recovery or disposal of products is already accounted in the PRTRs.

Releases from raw material production and manufacturing of products are typically included in the existing PRTRs, and are therefore not the focus of this project. Releases from the waste management are to a certain de-

gree reported and accounted for in the PRTRs, as the recovery plants, incineration facilities and landfills report their releases to the PRTRs. However, these releases are not in all cases traceable back to the products generating these emissions, since they are aggregated as total releases from a facility or from a landfill. The focus of this project is not on these releases. The production and manufacturing processes can be separated from the use of the products, since releases from products are considered to originate from diffuse sources that are normally calculated by environmental authorities, while releases from point sources are reported by the sources themselves. To date, these releases from products are generally not accounted for in the existing PRTRs.

The life-cycle of products is illustrated in Figure 4.

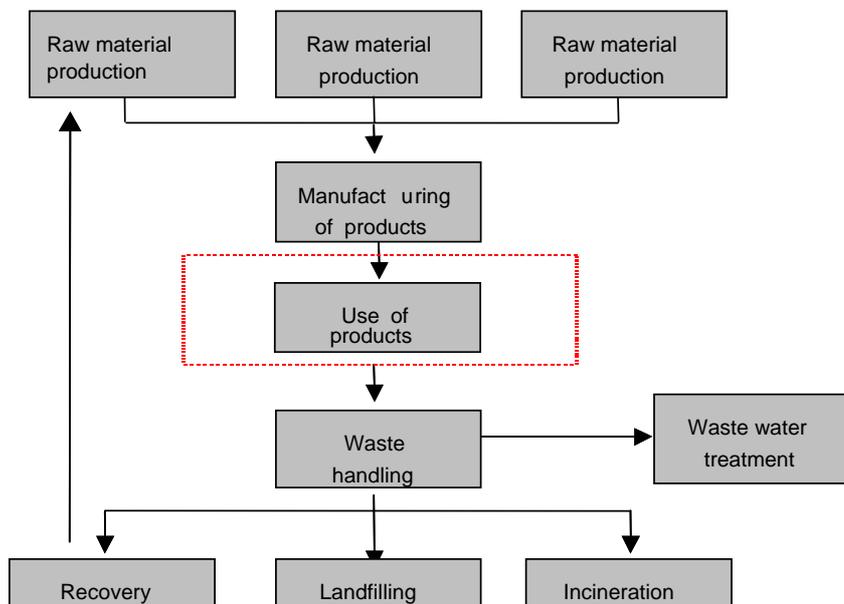


Figure 1: Product life cycle phase

The figure above is actually a simplification because in practice the product chain is often longer and more branched. The area of focus, the use phase of products, is surrounded by dashed red line.

2.3 Significance of Releases from Products

Releases from manufacturing of products in the industry are already included in the PRTRs under the point source releases. These releases have been closely monitored and inventoried, and the trend shows that the releases has decreased significantly during the lasts decades. However, releases from the other parts of the life-cycle of products are not equally

well covered. Along the increased consumption and economic development both, the number of products and their production volumes have expanded significantly, as well as the number and volume of different chemicals included in the products. This can be illustrated with some examples from Norway.

Releases of Lead

Industry and road traffic were in the past decades the prevailing sources of lead emissions. As various abatement measures were imposed on the industry and leaded gasoline has been phased out, the lead emissions into the air have reduced significantly. Releases from the use and disposal of products have gradually become a larger part of the total national releases. This is illustrated in Figure 1. Information is taken from the website “Miljøstatus i Norge” (“Environmental Status in Norway”), published by the Norwegian Ministry of Environment.

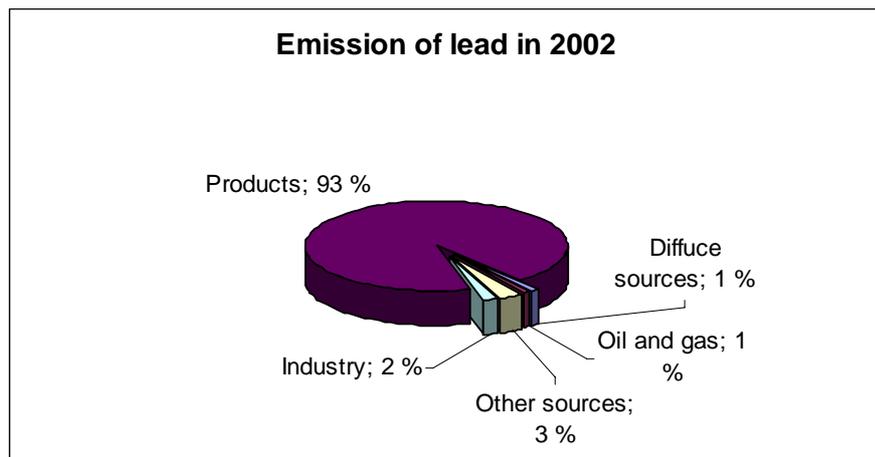


Figure 2: Lead emissions to air in Norway from various sources in 2002

Releases of Chromium

Figure 2 illustrates a similar situation for chromium releases to air in Norway. Previously, the industrial emissions were significantly higher, but are reduced due to development of both production technology and abatement techniques. At present, products account for the largest part of the releases.

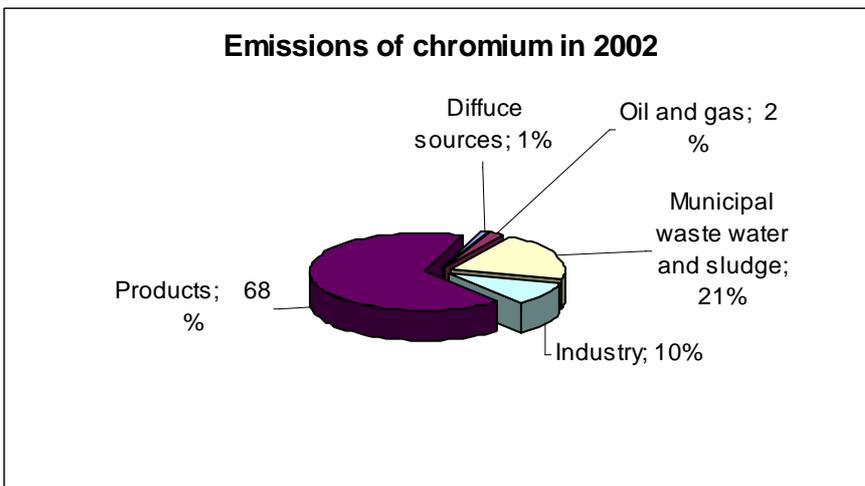


Figure 3: Chromium emissions to air in Norway from various sources in 2002

Releases of Mercury

For mercury the situation is less clear, but releases from products account for approximately 23% of the total national releases, amalgam releases from dental fillings being a significant player.

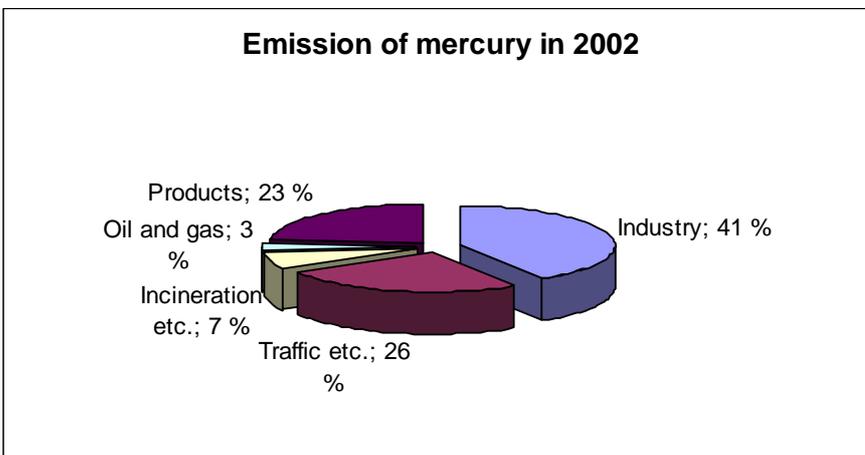


Figure 4: Mercury emissions to air from various sources in 2002 in Norway

Releases of Organic Substances

In the case of several hazardous organic substances, like nonylphenols and surfactants, products may account for even a higher share of the releases than shown in the examples above. In general, the knowledge of the impacts of organic pollutants is vague, and the inclusion of these compounds in the PRTRs may considerably add to the present level of knowledge on the releases of these pollutants.

The examples given in this section illustrate clearly that products is a major source for the releases of many pollutants. In many countries the

present PRTR registers do not include releases from the use of products, and will therefore only account for a part of the total releases of numerous substances and compounds. This deficiency may result in wrong assessments of the environmental impacts in a region, because it is possible that a large part of the emissions of a specific chemical is not at all accounted.

Further, reduction of releases from point sources is not always the most efficient means of action when releases from products give high impacts. Inclusion of releases from the use phase of products in PRTRs could also give manufacturers and importers an incentive to reduce the hazardous impacts of their products.

2.4 Parameters defining Releases from Products

When estimating releases from products, several types of data and parameters can be used:

- *Consumption figures:* The amount of products taken into service;
- *Substance content factor:* The quantity of the substance per unit of products;
- *Emission ratio:* Percentage of a substance in the products taken into service released by a specific pathway during the entire lifetime of the product;
- *Emission factor:* Quantity of a substance released by a specific pathway per unit of products (stock or consumption) per unit of time; and
- *Service lifetime:* The time the products can provide their service.

3. Status of inclusion of releases from products in PRTRs

3.1 The used Methodology

One goal of this project was to explore the status of information on the releases from products in the existing PRTRs. To this end, a survey was carried out in two steps: first by the means of a questionnaire and then by interviews and email contacts with the identified key persons and organizations. The investigation also included a study of relevant reports and websites.

A total of nine questionnaires were submitted to environmental authorities in Australia, Belgium, Canada, France, Japan, the Netherlands, Switzerland, UK and USA. All these countries are members to the OECD Task Force on PRTRs. Additional information was collected from Denmark, Finland, Norway and Sweden. During July and August 2005, all countries except one responded to the questionnaire.

The questionnaire included the following topics:

- Please state name and web address of the Pollutant Release and Transfer Register (PRTR) your organisation is in charge of.
- Are releases from products included in this PRTR?
- How is the term "product" defined in your PRTR?
- If the PRTR includes releases from products, can you give more information on the type of products and type of releases?
- Are you familiar with any other type of pollutant release register in your country (for instance related to specific trades, processes or products)?
- Are releases from products included in any of the above mentioned registers?
- If any of these registers include releases from products, can you give more information concerning the type of products and type of releases?
- If you have other relevant information or other sources of information related to this topic, please provide the contact information.

3.2 Overview of the Inclusion of Releases from Products in PRTRs

Responses to the questionnaire and other sources of information revealed that some of the PRTRs include information on releases from products. Table 1 gives an overview of the PRTRs that were surveyed. The table displays the respondents' own opinion and evaluation of the reported registers. None of the respondents answered the question regarding the definition of "products".

As can be seen from Table 1, some countries have included inventories and registers of air emissions when reporting their PRTR registers. We are aware that also other countries than those listed in Table 1 have air emission inventories which include partial information on releases from products. The list of air emission registers included in Table 1 can thus be seen just as an example of such registers.

Table 1: Overview of the inclusion of releases from products in the surveyed PRTRs.

Country	Register	Includes releases from products
Australia	Australian National Pollutant Inventory Over 3,000 facilities from a wide range of industry sectors report annually to the NPI. www.npi.gov.au	No
Belgium	No register has been developed. PRTR and reporting of data to the European Commission is the responsibility for each region/state.	
Canada	The National Pollutant Release Inventory is a database of pollutants released to the environment or transferred off-site as waste or for recycling from major industrial point sources. The inventory includes the Criteria Air contaminations Inventory. http://www.ec.gc.ca/pdb/npri/npri_home_e.cfm	To some degree
Denmark	Register of Environmental Aspects of Industrial Installations Today, 158 installations are included in the register. These are large industrial or agricultural installations which release of one or more of the 50 substances on the substance list. The enterprises have the obligation to report on relevant substances ending up in their products, but product content is not yet included in the register. https://secure.mim.dk/mst/simi/default.asp?lanId=2	No
Finland	A national PRTR is not completely established yet. The national air pollutant inventory including releases from some product groups can be found on website http://www.ymparisto.fi/default.asp?node=13256&lan=en	No
France	http://www.pollutionsindustrielles.ecologie.gouv.fr/IREP/index.php	No*
Japan	Reporting system of environmental releases of chemical substances (PRTR) Ministry of the Environment http://www.env.go.jp/en/topic/prtr.html National Institute of Technology and Evaluation http://www.prtr.nite.go.jp/index-e.html	To some degree
Netherlands	The Emission Register of the Netherlands	Yes
Norway	Norwegian Pollution Control Authority: Emissions from companies. www.sft.no	No

Country	Register	Includes re-leases from products
	Norwegian inventory on releases from products Annual report on use and releases of selected hazardous substances from products.	Yes
	Norwegian Statistics: Emissions to air related to sector and type of manufacturing. http://www.ssb.no/english/subjects/01/02/	To some degree
Switzerland	A national PRTR is in progress, but is not published.	No
Sweden	Pollutant Release and Transfer Register Data are taken from facilities' annual environmental reports. Only larger facilities included. http://www.naturvardsverket.se/kur/	No
UK	Pollution Inventory (PI) The Pollution Inventory (PI) is an annual record of pollution in England and Wales from selected activities from major industrial sites. www.environment-agency.gov.uk/pi	No
UK	UK National Atmospheric Emissions Inventory (NAEI) – The official air emissions inventory for the UK. http://www.naei.org.uk/	To some degree
	Scottish Pollutant Release Inventory (SPRI) – Record of pollutant releases to air and water from scottish industry regulated by the Scottish Environmental Protection Agency http://www.sepa.org.uk/spri/	No
	Northern Ireland Environment and Heritage Service Pollution Inventory (EHSPI) Record of pollutant releases to air and water, including off-site waste transfers from industry regulated by the Northern Ireland EHS. http://www.ehsni.gov.uk/environment/industrialPollution/ipc.shtml	No
United States	NJ Release and Pollution Prevention Report (RPPR) and Pollution Prevention Plan Summary www.state.nj.us/dep/opppc/	To some degree
United States	US EPA Toxic Chemical Release Inventory (TRI) www.epa.gov/tri The Toxics Release Inventory (TRI) is a publicly available EPA database that contains information on toxic chemical releases and other waste management activities reported annually by certain covered industry groups as well as federal facilities.	No
	State of Massachusetts Toxic Reduction Use Act (TURA) http://www.mass.gov/dep/bwp/dhm/tura/ Several hundred facilities reported the use of approx. 200 listed toxic substances.	To some degree

3.3 Discussion of Findings

3.3.1 *PRTR Registers and their Properties*

The survey showed that PRTR registers in the OECD countries include information on releases from products only to a limited degree.

In the Japanese PRTR the releases of a wide range of targeted substances are reported from industry (including the use of products in the manufacturing industry), as well as from the end use of products. The Japanese PRTR system presents aggregated data (compiled by the government) and provides a well developed system of release estimation techniques to estimate releases from a range of sectors and from the use of products. The industry sectors seem to be deeply involved in the development of estimation techniques.

The Norwegian inventory of releases from products has similarities with the Japanese system what comes to the estimation of releases from the use of certain product groups. The number of targeted substances is smaller, but the Norwegian inventory includes releases from the so called “processed solid products”. The Norwegian inventory of releases from products is not a part of the Norwegian PRTR, but it published as a separate annual report. The information is used together with the information from the PRTR and other information sources to produce the website “Environmental Status in Norway” (see Section 2.3).

The Dutch system includes reporting of chemical substances as well as air emissions. Releases from the use and disposal of products are included in the inventory of emissions to air. The inventory data can be combined in various ways to provide statistics for a given region or a sector.

The systems of Massachusetts and New Jersey include the content of targeted substances, both as releases, transfers and as releases in products shipped to the market. This data is accessible to the local governments and residents. Information on the content of specific substances in products is used as an indicator to follow the efficiency of the government actions to reduce the use of these substances. This type of reporting of the aggregated content of substances in products is very different from the approaches seen in other countries, but similar to the Danish system.

Table 2 gives a short summary of the properties of the PRTRs that include product information.

Table 2: Properties of PRTRs including releases from products

	Sources of product data	Type of product emissions and recipient	Part of product life cycle reported	Examples of product information
Japan	Yearly reports from industrial enterprises of a certain size and sector. Statistics. Estimation from selected sectors, smaller companies and end use of products	Targeted chemical substances 354 substances in 2003	Manufacture, use and discharge of products	Among the top chemicals with largest releases in Japan are Lead and its compounds: used in batteries, optical glasses and pigments
Norway	Yearly report compiled on the basis of import/export statistics, the Norwegian Product Register, SFAs and information from producers	Targeted substances in chemicals and solid processed products	Use and waste handling of products	Releases of heavy metals and hazardous organic substances to air, water, ground and as transfers to waste
Netherlands	Statistics Emission factors	<i>To air:</i> Greenhouse gases Particles ozone depleting substances Solvents <i>To soil:</i> Heavy metals Creosote PAH	Emissions from domestic production Emissions from the use of selected products	Solvent emission from the use of paints. Emission of metal salts from preserved wood
Massachusetts USA New Jersey, USA		Targeted chemical substances Approx 200 substances	N/A	Content of substance in products from a given company. Name of company with products containing targeted substance.

In order to fulfill the obligations concerning the Long-Range Transboundary Air Pollution (CLRTAP) and the Climate Framework Convention (UNFCCC), several countries have established inventories on their national total emissions to air. In some countries these inventories are linked with the national PRTR systems (for instance in Canada and in the Netherlands), whereas in other countries this information is given in other type of registers or formats (for instance in Finland, Norway and UK). Calculation of air emissions from products in the national air emission inventories is based on data from several sources such as product registers, consumer statistics and also from specific surveys. Some examples are shown in Table 3.

Table 3: Examples of Air Emission Registers

	Sources of product data	Type of product emissions and recipients	Part of product life cycle	Examples of type of product information
UK The UK National Atmospheric Emission Inventory (NAEI)	Estimates are calculated by applying an emission factor to an appropriate statistics. The statistics are provided from industrial associations, and emissions factors are developed for different products and applications.	Greenhouse gases, nitrogen compounds, ozone depleting substances, VOC, particles, metals etc Air emissions	Manufacture and use of products. Aggregated data from waste treatment	Kg CO2/
Norwegian Statistics	The statistics are provided from industrial association, waste treatment facilities, material companies (handling the recycling of materials) and other inventories.	Air emissions	Those parts of the life cycle that contributes to main emission.	

3.3.2 Applied Data Collection Methods

When comparing the “typical” PRTR reporting on releases of chemical substances and the registers on air emissions (long-range air pollutants and greenhouse gases), there are some differences in the data collection approach.

The compilation of data (by governments) on emissions from the end use of products for air emission inventories is basically based on a *top-down* evaluation approach. The data flow for estimating the air emissions from the use of end products is illustrated in Figure 5.

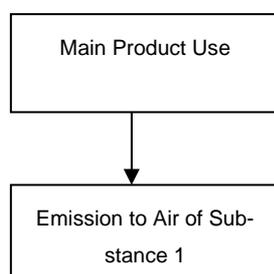


Figure 5: Data Flow for Estimation of Air Emissions from end use of Products

The information in PRTRs on releases of selected chemical substances contained in products is partly based on the bottom-up approach when the companies or sectors of a certain size or characteristics report on the substances contained in their products on the basis of a given list of priority substances. Figure 6 illustrates the flow of this data.

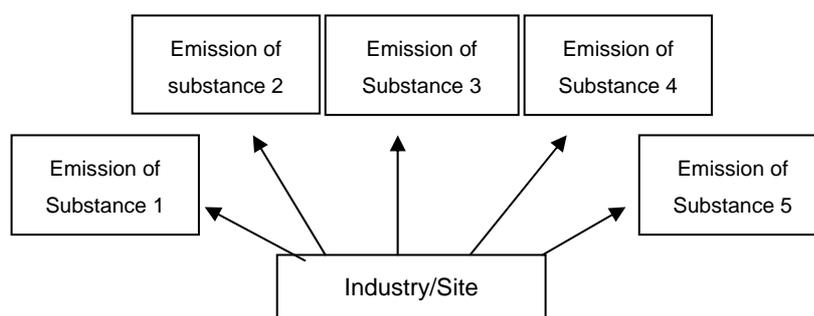


Figure 6: Data Flow when Companies report on Releases from Products

The Norwegian inventory of releases from products may also serve as an example on how a combination of different data sources may be applied for the quantification of substances in products. Data is collected from a range of sources and registers, such as the Norwegian Product Register, import statistics, substance flow analyses and from selected traders and producers. The data in this inventory can be used as input to the Norwegian PRTR to include product releases.

The Japanese system is based on a comprehensive reporting from industrial sites, as well as on estimation of releases from those sectors and products giving significant contribution to the emissions of the selected chemical substances. The Japanese system follows the releases from products all through the life-cycle, from the use in the manufacturing processes to the use by households.

4. Data sources

4.1 Relevant Data Sources

As the individual enterprises are the main source of information on releases from point sources, the releases from products in a country have to be estimated by combining information on consumption figures and stocks with relevant emission factors derived from a variety of data sources.

Direct information from the industry on the content of hazardous substances in their products may be a primary source of information on the domestically produced products.

Other data sources of relevance for estimating releases from products are:

- Product registers;
- Emission Scenario Documents (ESD);
- Life cycle assessments (LCA) and Life cycle inventories (LCI);
- Risk Assessments;
- Substance Flow Analyses (SFA);
- Emission inventory guidebooks and databases¹;
- Environmental Product Declarations (EPD);
- National production statistics and import/export statistics;
- Input – output tables including physical or environmental accounts (PIOT, NAMEA); and
- Other data sources (for instance, Oekopro database, OECD Risk Management documents, Ecolabel backgrounds documents).

4.2 Discussion of Findings

Information on data sources, relevant information and data availability is summarised in Table 4.

¹ Link: OECD PRTR Resource Centre for PRTR Release Estimation Techniques (RETs) (<http://www.oecd.org/env/prtr/rc>)

Table 4: Data sources, their object, provided information and data availability

Type of data sources	Object	Relevant primary information	Data available
Product registers	Single chemical products Ex: Malatax® glass adhesive	Consumption (supply of products) Substance content factors	Database
Emission Scenario Documents	An industry sector or group of chemicals Ex: Plastic additives	Emission factors and Emission ratios	Documents
LCA/LCI databases	Unit processes Ex: calcination process by cement production	Substance content factors. Emission ratios and Emission factors (to be estimated from basic data)	Database- but emission factors and ratios cannot easily be extracted
Risk Assessments	A single substance Ex: Chromium trioxide	Emission factors and Emission ratios (to be estimated from basic data) Release routes	Documents
Substance flow analyses	A single substance or a substance group Ex: Mercury and mercury compounds	Substance content factors Emission factors and Emission ratios (to be estimated from basic data)	Documents
Emission inventory guidebooks and databases	Activity groups Ex: Aluminum production	Emission factors for releases to air	Document/Database
Environmental product declaration (EPD).	A single traded product Ex: ISIS® polystyrene sheets	Substance content of products. Life cycle based releases.	Document
Production statistics and import/export statistics	A commodity group: Ex: 6406 9100 "Part of footwear of wood"	Consumption (supply of products)	Database
Input-output tables	An exchange in monetary terms between sectors Ex: The purchase of sector "Construction" from sector "Manufacturing of cement"	Sector specific consumption figures	Database

The data sources listed in Table 4 hold large quantities of information that may be used to compile data on releases from products. Examples of available information are:

- Contents of hazardous substances in products;
- Description of emission scenarios;
- Consumption data;
- Emission rates; and
- Emission factors.

Much of this information is not directly applicable to PRTRs, but will have to be extracted from documents and reports and adapted for the

PRTR purposes. Relevant information sources include Emission Scenario Documents, LCA/LCI databases, Risk assessments, Inventory Guidebooks, Substance Flow Analyses and Environmental Product Declarations. The Norwegian annual report on releases from products is partially based on this kind of information sources.

Substance Flow Analyses

Substance Flow Analyses (SFAs) are valuable sources of information for identifying the types of products that contain particular hazardous substances.

Life-Cycle Assessments/Product Declarations

These documents can be used to identify the part of the life-cycle where the releases occur.

Product Registers

Product registers contain information on actual data on a significant part of all chemical products produced and used in a country. By combining the supply figures and the substance content factors presented in the product register with relevant emission factors a comprehensive inventory of releases from the use of these chemical products can consequently be compiled. The Norwegian inventory of releases of hazardous substances is the only example of direct application of product register data for compiling inventories of releases of substances. However, product register data is widely applied to SFAs.

Import/Export and Production Statistics

Most countries use the same nomenclature (the Harmonized System) in their import/export statistics, whereas different nomenclatures may be applied for production statistics. In some countries the same nomenclature are used for both statistics. For this reason it is often possible to estimate the supply of products in the country at a much more aggregated level. In order to estimate releases from products it is often necessary to have more detailed information on the supply of products (*e.g.* solvent based in-door paint) and it may consequently be necessary to supplement the national statistics with statistics obtained from trade organisations, individual producers and suppliers. However, the applicability of these registers for the use of estimating releases from products is largely based on the reporting requirements to the register, *i.e.* whether the product volumes are reported as actual or in large volume ranges.

The national product balance provides total national supply figures. For estimating releases from products, it may, for some product groups, be essential to disaggregate the national supply figures into sector specific figures (for example: paint used in manufacturing industry, in construction, in households). National input-output tables may in principle be

used for this disaggregation, but it is unclear to what extent the tables in practice would be applicable due to the existing high aggregation of the tables.

5. Strategies for including releases from products in PRTRs

5.1 Experiences with existing PRTRs

As mentioned in Chapter 3, none of the existing PRTRs include a full range of releases from the use phase of products. Several countries include air emissions from the use of a limited range of products, mainly emissions of Volatile Organic Compounds (VOC) from paints, cosmetics and pharmaceuticals.

Japan and Norway report releases of certain chemicals from the use phase of selected products, but neither of these two PRTRs does it comprehensively, since the data is only available in annual reports. In the Japanese PRTR the product release data is combined with emission data from point sources and diffuse sources. However, the selection of products is limited to chemical products, such as detergents, paints and adhesives. Solid processed products, for example computers, plastics, batteries and textiles are not included.

Although both the Japanese and Norwegian registers are incomplete, they demonstrate the importance of including releases from the use phase of products in PRTRs to get a more complete picture of the overall releases of harmful pollutants. Both systems give examples of information sources and release estimation techniques that may serve as a basis for further development of data on releases from products in PRTRs. Information that can be used to estimate releases from products is available from various sources, but the information needs to be adapted for the purposes of PRTRs.

5.2 Methodological Approach

5.2.1 *Top-down and Bottom-up*

When discussing releases from the use phase of products, one must bear in mind the vast number of products available, though not all of these produce harmful releases. It is important to limit the task by finding the “most harmful” products. Hence, a combination of the two approaches could be favourable to obtain a good result:

- Which pollutants should be included?
- Which products should be included?

5.2.2 *Selection of Pollutants*

Most countries have priority pollutant lists and corresponding plans for reduction of releases. European Union (EU) has a list of 50 pollutants selected for reporting to the European Pollutant Emissions Register (EPER). Lists also exist within the frameworks of international conventions restricting emissions into the air.

As this project on releases from products would involve all OECD countries, it seems suitable to start out with pollutants that are prioritised by a majority of OECD countries. One starting point could be the list of substances reported to the EPER register. However, the EPER list focuses on substances that are most relevant for industrial processes. These are not necessarily the pollutants released from the use phase of products. Releases from products normally reflect the substances used in the production of the product. For example, VOCs will be emitted from a solvent based paint during application, but also pigments, softeners, binders and other constituents may be released during the service life. The contents of a detergent will normally be released to water during the use phase.

Using the EPER list as a basis, the following sections in the list could be relevant for releases from products during the use phase: Section 2 (metals and compounds), Section 3 (chlorinated organic substances) and Section 4 (other organic compounds), whilst most pollutants in Sections 1 and 5 (*i.e.* greenhouse gases, nutrients and PM₁₀) are not relevant. In addition, organic substances that are known to have adverse effects on health and the environment, but that are not yet restricted in preparations, should be considered. Among these are some brominated flame retardants, medium chained chlorinated paraffins and also some surfactants and phthalates. The national priority lists could also provide good candidates for a common list of pollutants.

5.2.3 *Selection of Products*

The products to be included in the PRTRs should be chosen on basis of their contents of the specific harmful substances. This top-down approach is recommendable to limit the amount of work effort needed to produce the necessary information. As pointed out in Chapter 4, information on the use of the specific substances is available from various sources (*i.e.* substance flow sheets (SFA) and risk assessment documents). The Norwegian and Japanese inventories of releases from products also provide information on substances, the releases of which could be prioritised when estimating emissions from various products. Among the identified product types, further limitations should be made dependent on whether the designated pollutants are actually released from the product during its service life.

The discussion regarding the selection of products, should also address problems related to processed solid products (articles) and products with a long service life. The release estimation techniques may be rather complicated for these product types. However, they may constitute a considerable part of the total consumption of some hazardous substances, and thus hold a large potential for harmful releases.

5.2.4 *Examples of Substances and Products suitable for the Development of RETs*

The selection of products to be reported to the PRTRs needs to take into account the harmfulness of chemicals released during the use of products, as well as the production volumes. It should be kept in mind that the releases from products may either be direct or indirect.

For the purposes of release estimation, products may be categorized as shown in Table 5. The examples of randomly selected products in the table are categorized with respect to lifetime and predominant release pathways.

Table 5: An example of categorisation of products

Type of products		Examples of products types	Release pathway	Examples of pollutants
Solid, processed products	Long lived	Preserved wood	Ground, Water	Copper Chromium PAH
	Long lived	Softened PVC	Air, water, Ground	Phtalates Lead
	Medium lived	Fish nets Antifouling paint	Water	Copper, Tin
Chemical / technical products	Short lived	Paint	Air	NMVOC
	Long lived	Detergents	Water, Ground	Phtalates, Heavy Metals (Lead, Chromium)

Inclusion of products in PRTRs will involve the development of release estimation methods for at least these categories of products. The products in the table may serve as an example for demonstrating release estimation techniques for the various product types.

Detergents for domestic and professional use are an example of a product type with a short lifetime. Detergents may contain nonylphenol ethers and other surfactants. An example of an applicable release estimation technique is available in the Japanese estimation methods report. The same RET may be used for other products with similar characteristics, for instance for some cosmetic and pharmaceutical products. The emissions of Non-methane Volatile Organic Compounds (NMVOCs) from this category are already covered by the air emission inventories to international conventions.

Paints are products with a complex emission pattern. NMVOCs are emitted to air during the application of paints. Substances used as softeners (*e.g.* phtalates), preserving agents (*e.g.* formaldehyde) and pigments (lead, chromium) may emit to air or to the ground, as well as to water during the service life. The available release estimation techniques developed for NMVOC emissions from the application of paint may also be used for products with similar characteristics, such as adhesives and fillers.

Preserved wood is a long lived product with widespread use. Emissions may occur during production, storage, use, service life and waste management of preserved wood. The same estimation technique may be applied to all types of preserved wood. Potential pollutants released to air, water and soil are arsenic, chromium, copper and polyaromatic hydrocarbons (PAH compounds). The Norwegian EPA has developed a release estimation technique for emission of metals and PAH compounds throughout the whole service life of preserved wood. Relevant air emissions are already covered by the air emission inventories to international conventions by most countries.

Softened PVC products may serve as an example of long lived plastic products or components that may emit hazardous substances during their service life. Additives such as softeners, flame retardants and stabilizers may contain hazardous substances that may leak from the products during the use, *e.g.* phtalates and some brominated flame retardants. No release estimation methods have been identified. These emissions are not yet generally covered in PRTRs.

Fish nets are treated with chemicals to avoid fouling. As the antifouling chemicals are lost during the use of nets, the treatment is periodically repeated. The main release recipient is water. The chemicals used for fish nets may contain copper. Examples of possible release estimation techniques are available in the Japanese release estimation methods' report and in the Norwegian products release report. The same estimation technique, with some adjustments, may be used for other products with similar characteristics, *e.g.* antifouling paints for boats. These emissions are not yet generally covered in PRTRs.

Other examples on products produced in large volumes are *insecticides, fertilizers, construction materials, textiles and medicines*. However, the list of potential candidate groups of products for the purposes of this project is vast. The list of examples provided above is not complete, but may serve as a demonstration on how releases from the use of products may be estimated.

5.3 Getting started

Establishing common Guidelines

According to the PRTR Protocol under the Aarhus Convention, each country decides which diffuse sources it will report, and how the data will be presented. At present, few countries report emissions from the use phase of products. Generally agreed release estimation technique guidelines could encourage more countries to report emissions from products.

In case common guidelines would be developed, they must take into account the possible differences between countries, in relation to the use and disposal of products. The guidelines should be transparent on which release estimation techniques are to be used, and to allow adjustments when needed. For each chosen product type an emission scenario should be prepared, showing the main emission paths for the specific substances. The chosen release estimation techniques should be described for each pathway and substance.

Making use of existing Information Sources

Documents exist, *e.g.* for risk assessments, substance flow analyses, emission scenarios, etc. Likewise, national and international release estimation techniques are available to be applied in other countries.

The basis for most release estimation techniques will be the annual consumption of chosen products. The availability of such data may vary between countries. Reliable import/export and production statistics are important. Product registers for hazardous substances are useful information sources for some types of products. If reliable statistical data are not available, information could be collected from the industry and trade organizations, or directly from importers and producers.

Allow for National and Regional Adjustments

As mentioned earlier, differences exist between countries regarding the use and disposal of products. For example, building techniques and the choice of construction materials will to some extent depend on climate and temperature conditions. The consumption of electronic articles like mobile phones and computers is related to the economic situation of the country or region. Such factors will affect the consumption and to some extent determine which product types are most significant with respect to releases and their environmental impact.

There may also be differences regarding the composition and use of chemical substances in products with similar functions. This may come as a consequence of differences in the national regulations concerning the use of chemical products, but may also be due to differences in the quality and functional requirements.

None of these differences hinder in principle the establishment of common guidelines. However, it is important that the guidelines would contain information on how to make the necessary adjustments.

Preventing Double-counting

When compiling inventories of releases from products during the use phase, it is essential to prevent double-counting (*e.g.* not to allocate the releases from both the antifouling paint and the painted vessels). The inventory should only include releases from the end product, as defined in Section 2.1.

Presentation of Data – Geographical Allocation

Releases from products are not located at specific sites, and should be regarded as diffuse sources (area sources). Compiling emission data at national level will probably be the easiest approach to this task. National emission data will show how products contribute to the total emissions of designated substances. This information may be used by authorities in development of policies and regulations, by the public in choosing “green” products, and by the industry as input to developing products with reduced environmental impact.

Several countries aim at making PRTR data available on regional or even local level for diffuse sources (area sources). Commonly agreed methods should therefore be developed for disaggregating national emission data for the use of site specific products (*e.g.* fish nets and boats).

6. Conclusions and recommendations

Examples given in this report demonstrate that for many pollutants, products account for a large part of the emissions of hazardous substances. Hence, it would be important to work towards a wider inclusion of these emissions into the PRTR registers. PTRTs based solely on point sources, only account for a part of the total emissions, which limits their use in environmental decision making.

There are countries like Japan and Norway that report emissions from the use of products. Though these registers are not complete regarding the various product and release types, they demonstrate that it is possible to include such releases in PRTRs. They contain examples of information sources and release estimation techniques that may serve as a basis for further development.

Extensive work has been carried out in OECD member countries regarding environmental characteristics of products. This information could be used to prepare a proposal for selection of substances and products suitable for the development of release estimation techniques for releases from products. However, much of relevant information that may be used to compile release estimation techniques for releases from products is not yet directly applicable but will have to be worked out and adapted to this purpose. This report proposes a line of action to get this work started.

Based on the findings in this report, it is recommended that the project be continued as follows:

- Recommend to the 40th Joint Meeting conducting a more detailed study focussing on the releases of a few different kind of chemicals from the use of a few selected different kind of end products, in order to enhance the detailed knowledge of the relative share of releases from products and get experience of the applicable methodologies; and
- Recommend closer investigation on the releases of lead (to air and water) and nonylphenol (from detergents to water) from the use phase of end products. The analyses should provide release estimation techniques (RETs) for these chemicals and increase the overall knowledge and experience of applicable RETs.

It is also recommended that on the basis of the outcome of the studies mentioned above, generally agreed guidelines for release estimation techniques be developed to encourage more countries to report emissions

from products. In case such guidelines would be developed, they must take into account the possible differences between countries, in relation to the use and disposal of products. The guidelines should be transparent on which release estimation techniques are to be used, and to allow adjustments when needed.

Sammendrag

Prosjektets målsetning

Målet for dette prosjektet er å legge et grunnlag for videre arbeid med å inkludere utslipp fra produkter i nasjonale utslippsregistre (PRTR).

Dette skal oppnås ved å:

- Utarbeide en oversikt med hensyn til status for rapportering av utslipp fra produkter i eksisterende registre i OECDs medlemsland
- Utarbeide en oversikt over eksisterende informasjonskilder for utslipp fra produkter, og hvordan disse kan brukes i arbeidet med utslippsregistre
- Identifisere produkter og kjemiske stoffer som kan benyttes til å utarbeide metoder for å estimere utslipp.
- Foreslå tiltak som kan gjennomføres av OECD for å bistå medlemslandene i deres arbeid med å inkludere produkter i utslippsregistre.

Spørreundersøkelse og litteratursøk

Det ble gjennomført en spørreundersøkelse blant noen av OECDs medlemsland for å undersøke status med hensyn til rapportering av utslipp fra produkter. Spørreskjemaer ble sendt til miljømyndighetene i de OECD-landene som deltar i arbeidsgruppen for utslippsregistre. Det ble også gjennomført en litteraturstudie for å undersøke hvilke informasjonskilder som inneholder opplysninger om utslipp fra produkters bruks- og avfallsfase.

Status vedrørende utslipp fra produkter i eksisterende PRTR

Rapporten inneholder eksempler som viser at utslipp fra bruks- og avfallsfasen til produkter utgjør en betydelig del av totalutslippene for mange farlige stoffer. Det er derfor viktig å inkludere slike utslipp i utslippsregistre. Når registeret kun omfatter utslipp fra punktkilder vil en vesentlig del av den totale utslippsmengden mangle, og dette forringer registerets verdi som verktøy i forhold til planlegging av utslippsreducerende tiltak.

På tross av dette er det svært få land som i dag inkluderer utslipp fra produkter i sine utslippsregistre. Japan og Norge rapporterer utslipp fra bruk av produkter. Informasjonen er ikke fullstendig med hensyn til produkttyper og utslippsveier, og kan i liten grad brytes ned til regionale eller lokale nivåer. Likevel kan de tjene som eksempler på at det er mulig å inkludere utslipp fra produkter i utslippsregistre, og de inneholder ek-

sempler på informasjonskilder og beregningsmetoder som kan utgjøre en basis for videre arbeid.

Informasjonskilder

I regi av EU og OECDs medlemsland er det utført mye arbeid for å kartlegge miljøpåvirkning fra produkter. Det finnes mye informasjon tilgjengelig som kan brukes for å sammenstille utslipp fra produkter. Eksempler på tilgjengelig informasjon er opplysninger om innhold av farlige stoffer i produkter, utslippsscenarier, beskrivelse av utslippsmønstre og utslippsfaktorer. Mye av denne informasjonen foreligger i en form som gjør at den ikke er direkte anvendbar i et utslippsregister. Informasjonen må bearbeides og tilpasses til bruk i ulike registre.

Videre arbeid

En veileder som viser hvordan utslipp fra bruk av produkter kan beregnes vil kunne bidra til at flere land inkluderer slike utslipp i sine utslippsregistre. Veiledningen må ta hensyn til at det kan være ulikheter mellom land og regioner med hensyn til sammensetning, bruksmåte og avhending av produkter. Det er viktig at datagrunnlag og beregningsmetode beskrives tilstrekkelig detaljert, slik at tilpasninger kan gjøres ved behov. Forskjellene mellom land og regioner er trolig ikke større enn at det vil være praktisk mulig å benytte felles retningslinjer for utslippestimering.

Det er utarbeidet en liste over produkttyper som kan brukes som utgangspunkt for å utvikle metoder for utslippsberegninger-/estimer. Disse produkttypene representerer ulike kategorier av produkter med henyn til levetid, utslippsmønster, fysiske egenskaper og innhold av farlige stoffer. Ved valg av stoffer som skal rapporteres bør det tas utgangspunkt i prioriteringslister fra OECDs medlemsland. EPER -lista fra EU kan brukes som et utgangspunkt.

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