United Nations Institute for Training and Research

UN environment
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Communication and Interpretation of Pollutant Release and Transfer Register Data

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I. Background

The purpose of the factsheet is to integrate the information given in the video module (available at http://prtr.unitar.org/site/unique/1372).

Read more about:

- ✓ The characteristics of PRTR Data and its beneficiaries
- ✓ The main tools used to disseminate the data
- ✓ Which communication strategy to be adopted
- ✓ Main actors to disseminate the information

For each element, this document presents recommendations from UNITAR, UNECE, OECD and US EPA and provides options for the development of a successful communication strategy and awareness raising campaign of national Pollutant Release and Transfer Register.

The dissemination of PRTR data can be achieved through different means and plays an essential role in the availability and free access to environmental information. We should always consider the fact that making data available to the public is one of the core features of all PRTR systems: access to PRTR data allows users to use and benefit from the information contained in the database of the register.

How PRTR data are presented and disseminated, and to what extent, can affect how valuable and useful the data are.

Different techniques can be used to present and disseminate the data, thereby helping a wide variety of audiences to access PRTR data and to better comprehend what the data mean.

By making the information on emissions and releases into different media (air, water, land) available to the public, PRTRs can help promoting pollution prevention, encourage tracking, comparison and improvement of environmental performance.

Research shows that, within a country with a PRTR system, various stakeholders benefit from access to PRTR data:

- **The public** can use PRTR data to: identify potential chemical exposures and risks; make informed decisions, and monitor the progress of facilities' efforts to lessen

their environmental impacts or make improvements in sustainable development practices.

- **Governmental agencies** can use PRTR data to measure trends in pollutant releases and waste generation, to inform environmental policy decisions, to assess progress towards sustainable development on a global scale and to identify potential human health and environmental risks, and comply with reporting requirements under international agreements and convention.
- **Regulated entities** (industries, facilities, operators) can use PRTR data to identify opportunities to improve efficiency, reduce wastes and associated costs, and monitor their own progress towards sustainable development.
- **Other stakeholders**, such as non-governmental organizations (NGOs), researchers, news media, and academicians, benefit from access to published PRTR information on local, regional or national scale for various end uses related to research and investigation.

Lessons learned from international experiences on PRTR implementation, have identified different strategies and methodologies to disseminate data reported and create awareness on the existence of these registers at national level.

The methods presented in the factsheet are not mutually exclusive, since no one approach serves all purposes!

Thus, they can be implemented fully, partially or simultaneously. National circumstances and availability of resources will also play a role in the development of the strategy.

These are some of the key questions that the national authority in charge of developing the dissemination strategy and awareness campaign must be able to answer:

What are the PRTR's goals?

Who are the users of PRTR data?

What do PRTR users need?

What data will be disseminated?

How data can be presented in a user-friendly manner?

What contextual information are needed?

Where should data be located ensuring easy-access?

II. Identify the National PRTR's goals

The specific national objectives chosen for the PRTR system will shape and direct the overall PRTR design project. It is very important that the various national stakeholders agree upon, and clarify, the objectives and goals of the national PRTR system, prior to designing the system.

Research conducted by UNITAR and the IOMC, identified specific national needs that can be pursued through the register. During the identification of national goals, national authorities can look at the objectives that PRTR systems have served in other countries across the world that are relevant also for the country. International and regional cooperation is an important mechanism for implementation, information exchange and standardization among PRTR systems.

The following list of possible PRTR objectives could be used as a useful starting point:

- Integrating and harmonizing reporting requirements;
- Encouraging cleaner production;
- Identifying opportunities and encouraging pollution prevention;
- Improving public participation in environmental policy decision-making;
- Identifying geographic areas of environmental concern and setting priorities;
- Monitoring progress toward environment goals and policy objectives;
- Fulfilling the public's right-to-know by providing environmental information to the public;
- Improving the public's understanding of environmental issues.

The list could be extended, according to national circumstances, needs and objectives. For these reasons, some PRTR goals can be different from one system to another.

A common ground for PRTR design and development is offered to countries by the UNECE Protocol on Pollutant Release and Transfer Registers (PRTR Protocol). The Protocol was adopted at an extra-ordinary meeting of the Parties to the Aarhus Convention on May 2003. The Protocol is the first legally binding international instruments on PRTRs, it is composed of thirty articles and four annexes, covering 64 activities and 86 substances and thresholds for reporting.

III. Users and beneficiaries of PRTR data

There is a great variety of users of PRTR data, ranging from all levels of government to the public. A good example of the range of audiences that would be interested is found in a report on environmental reporting by the Canadian Institute of Chartered Accountants (1994); the report identified the following audiences as being interested in environmental performance information: employees, investors, creditors, governments, communities, suppliers, consumers, environmental groups, educational institutions, professional and industry associations and the media.

These different types of audiences can be aggregated into three primary groups:

- **Public:** PRTR data will help the public to be better informed and therefore to better participate in the decision-making process for environmental issues. This will enhance democracy in general and awareness of environmental issues. The public may also pressure poorly performing companies to improve contributing to pollution reduction. PRTR data will help the public have information about pollution in their neighborhoods and thus to gain knowledge of local health issues. Non-governmental Organizations (NGOs) both use and disseminate PRTR data. As a PRTR audience, NGOs' priorities and interests are as diverse as the nation's citizenry. In addition to NGOs, the financial sector, researchers, academics and facility employees all use PRTR data in different ways. Researchers and academics might use data for modelling or other studies. The financial sector use PRTR data for evaluating investment proposals or for considering insurance issues.

- **Governments:** PRTR creates transparency and permits the identification of national, regional and local correlations, laying the basis for long-term strategies and instruments for the control of releases of pollutants to air, water or land as well as transfers of waste and transfers of pollutants in waste water. PRTR systems links countries to an international network, e.g. data are useful to monitor facility compliance with permit requirements as well as national implementation of international commitments, such as plans for the reduction of greenhouse gas emissions. For example, PRTR systems could be linked to data needed for national and international emissions trading schemes. PRTR data help to identify activities that contribute to a specific environmental problem and consequently adopt more efficient regulatory actions.

- **Industries:** The efficiency of processes can be increased and optimized by the reduction or avoidance of releases of pollutants or waste, thus boost industry competitiveness and identification of potential cost reductions. PRTRs can serve as an incentive for finding innovative solutions that can improve environmental

performance and lead to sustainable increases in productivity. Participant facilities can publicize the improvements they have achieved proactively, thus furthering their good reputation and making themselves stand out in comparison with competitors. Through the open communication of results, facilities can foster their relationship with the general public and the authorities.

IV. Different needs for different users

Different types of audience, means different needs to be taken into account when considering both dissemination and presentation choices. Consultation with potential audiences or users of PRTR data - the public, industry and NGOs - is an essential step in identifying information needs that a PRTR could address. This approach will help to focus resources and efforts on approaches that best meet the needs of the public. Careful examination of goals, audiences, and specific information needs may suggest particular delivery mechanisms for making data available in different ways to meet various objectives.

For example, policy-makers can benefit from an analysis of aggregate PRTR data, looking either at trends in specific substances and groups of substances (such as carcinogens, persistent bio-accumulative toxins, volatile organic compounds or VOCs, carbon dioxide, commonly referred to as CO_2, ozone depleters, etc.) or monitoring performance of specific environmental policies. Government officials responsible for applying existing regulations can benefit from access to facility specific PRTR data as this provides them with precise information to determine “hot spots” (specific geographic concentrations), opportunities for pollution reduction and prevention by source, and other detailed analyses. Data can be also used for land-use planning and for emergency preparedness planning.

Industry can benefit both as users and disseminators of PRTR data as they prepare and track their own data. Facility and company personnel can identify cost-saving pollution prevention opportunities. Many companies use PRTR data as an input to their corporate environmental reports, which are themselves used by financial, environmental and community audiences. Opportunities for cleaner production and pollution prevention can be identified through the generation of site-specific data. Often facilities use PRTR data to compare environmental performance with others engaged in the same business activities. Trade associations and other business groups use PRTR data to track and publicize industry-specific progress in reducing releases and transfers of pollutants. PRTR data also help operators to identify needs for technical assistance on production processes and other industry related issues.

The public and NGOs have varying needs regarding PRTR data, mostly how this data might be best presented and disseminated. Often public interest is focused on a particular location or municipality. Some interests extend to both human and ecological populations, locally or in wider geographic regions. NGOs generally focus their attention on potential risk for health problems, such as exposure to cancer-causing substances or to allergens. Academia and research organizations working on risk screening use full PRTR data sets for a range of activities, including as an input into different models. Other groups might focus on working with certain industries.

V. Level of data aggregation

In most cases, PRTRs require facilities to quantify the amounts of listed substances released to each environmental medium (air, water, land) or transferred to other locations for waste management. National PRTRs vary considerably in terms of the chemicals that must be reported, the industries or business categories that must report, and the types of releases and transfers identified. Another basic attribute of PRTRs is their regular collection of data, in most cases annually. These characteristics—critical for assessing trends and tracking progress— influence dissemination plans and practices.

A key decision for governments is whether to disseminate all, some, or summarize the full set of reported PRTR data and to what extent it will be disseminated.

This decision is influenced by the goals of the system itself and the type of audiences and their needs. The most extensive dissemination programmes offer readily available public access to the complete PRTR database. At the other end of the spectrum are PRTRs that offer the public only aggregated summary of data. These may be limited to national totals summed by release medium (air, water, land) and by chemical, or the data may be aggregated by political subdivision (province, state, municipality). Therefore, **the goals of the PRTR play an important role in determining what to disseminate**.

Another important aspect to consider is that the extent to which data are made publicly available will determine the kind of analyses interested parties can conduct. For example, if the goal is to provide national trends for groups of chemicals to the public, then aggregated data can meet this goal. If the goal is to help policy makers determine trends and measure policy performance or provide academia with data for environmental research or modelling, then the reported data are needed. Evidence from existing PRTRs system in countries such as Australia, Canada, EU, Japan and the US, revealed that

both formats are used to disseminate PRTR data: interested users can browse data by either individual facilities and chemicals or by aggregate records.

PRTR data can be aggregated by theme, pollutant, annual releases or transfers, facility, or sector. In combination with other environmental information, the data can also contribute to an overall picture of pollutants being released and transferred. PRTR data for specific substances are necessary for inputs into evaluating potential risks and setting priorities for action. Industry-wide data can also serve priority-setting needs. Distribution of raw data, however, is essential for many applications, such as tracking environmental performance, assessing the effectiveness of existing emergency plans, modelling, analyzing pollutant sources in a watershed or air shed, identifying the types of business activities associated with releases of chemicals of greatest concern, or for performing other valuable analyses.

VI. Data presentation and interpretation

PRTR data can be analysed by many factors, for example by chemical group, geographic region, industrial sector or activity, type of release or transfer, type of media, and other parameters. Presenting the results of these analyses focuses attention on specific issues and opportunities, whether at national, state/provincial, or local levels.

In developing PRTR data presentations, countries should reflect their priorities and choose the most appropriate format to made PRTR data available. Several options include:

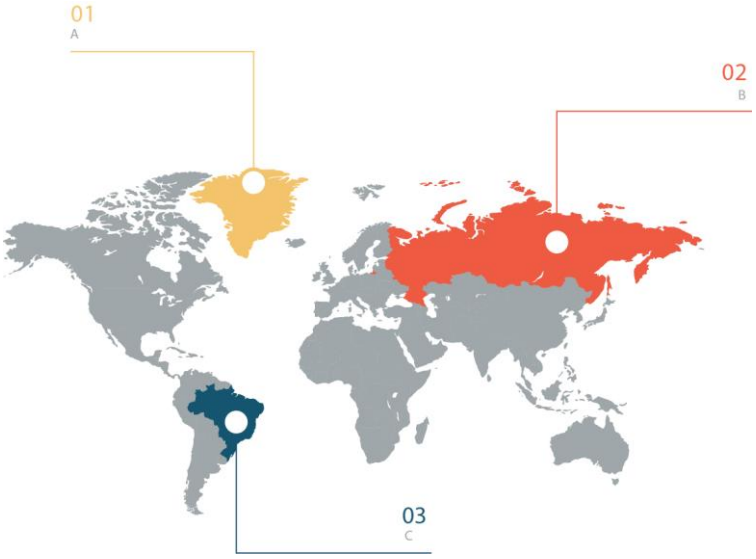
- Reports that provide summaries of PRTR data with interpretive text;
- Raw data files or databases;
- Analytical tool, such as mapping, queries and searchable databases;
- Press releases highlighting important trends or data points;
- Fact sheets designed for a specific audience or end use;
- Analyses combining PRTR data with other data (e.g. toxicity/risk measures).

For example, national summaries of PRTR data can answer questions regarding the total quantity of listed substances reported, or how these pollutants were released to air, water, land or transferred for recycling, treatment and disposal. Summary reports usually

provide data in tables and charts, with the aim to inform a broader audience about progress toward environmental goals as well as trends, identified through the amounts of releases and transfers of listed chemicals over the years. Summarizing the data helps to give a more easy-to-read overview of releases and transfers of hazardous substances in the country or in a particular region, however, the most peculiar feature of PRTRs is that reported data are searchable according to individual facility, owner/operator, type of pollutant, type of activity and environmental medium. This further level of presentation of specific-facility and chemical data serves community "right-to-know" (Aarhus Convention, 2001) and can aid both local governments and citizens' groups with their analyses.

The choice of an appropriate format and data presentation will affect how data are interpreted by users.

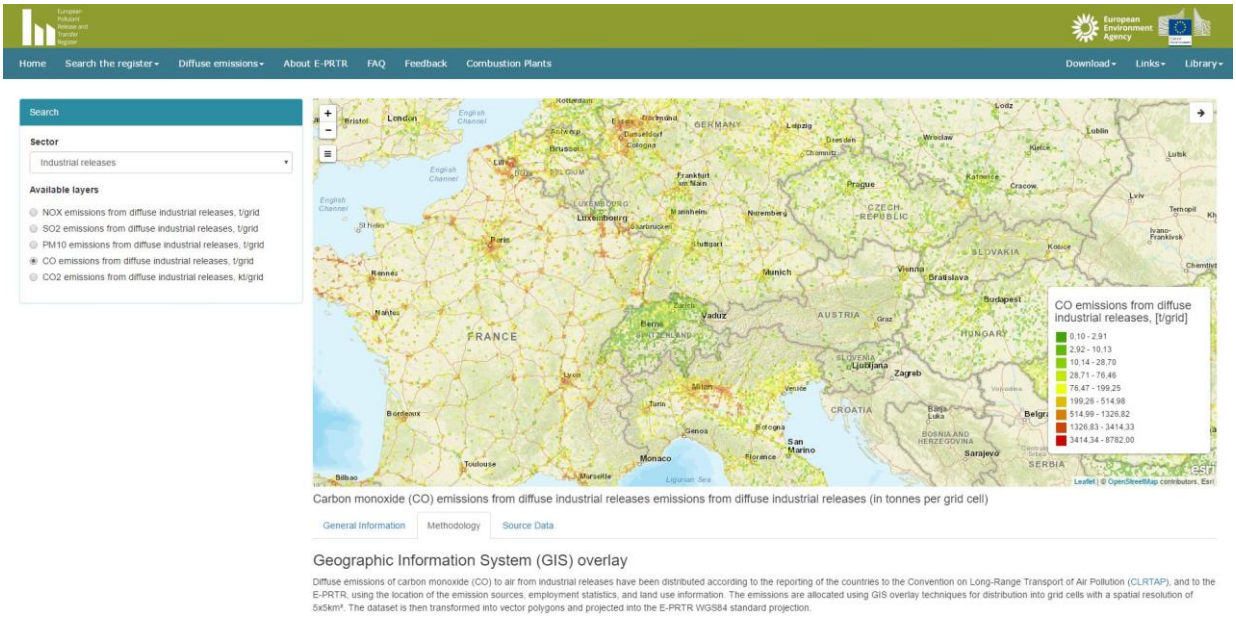
Visual tools can be used to support different purposes in presenting the findings of PRTR data analyses: charts (bar charts, pie charts, line graphs) and tables help to clarify the distribution and trends. These visual tools are complementary for accurate and appropriate interpretation of data by PRTR users, but they do not replace the reported data.



Maps are the tool of choice for displaying the results of geographic analyses and distribution.

Geographic presentation of data is an important feature of many existing PRTR systems. Maps and the geographic presentation of pollutant concentrations provide users with a simple and understandable presentation of conditions in a community, ecosystem or province.

Another purpose of GIS interfaces is to allow users to visualize their neighborhood in the map, with the exact location of industrial plants, facilities and operators that are reporting data to the PRTR system. Transparency in the amount of releases and use of chemicals will help industries to consolidate a positive relationship and trust among local communities; trends of PRTR data over time will prove to the public the commitment of industries to a greener and more efficient production.



E-PRTR map on Carbon monoxide (CO) emissions from diffuse industrial releases, *source:* http://prtr.ec.europa.eu/

An additional approach to present PRTR data is to sort them by specific theme or ranking. As an example, ranking states and/or provinces or smaller regions, industry groups, and individual facilities by total amounts released to the environment could help users to identify hot-spots and areas where to take action: ranking these or other groups by specific environmental media (air, water, land) can be a first step for governments in setting priorities and developing practical action plans. Facility lists, in particular, can be made more useful by presenting the same data first in rank order and then by location.

Published reports—even those that include facility-specific information—usually offer only selected data from the PRTR database. Even the most detailed documents may, for example, provide the amounts of each chemical that a PRTR reporter ships to other facilities for waste management, but not identify the receiving locations. Publicly accessible electronic databases may also supply only selected subsets of data. Even where complete data are made available, choices among forms of presentation involve selecting the data to be presented and emphasised.

VII. Additional contextual data

The way data are presented will affect users' interpretation and opinions. This is the reason why publishing PRTR data without giving context or additional information can be counterproductive.

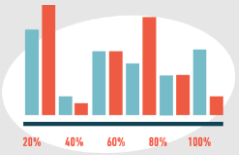
Governments and other PRTR disseminators may supply external data to help users put releases and transfers into context. These include geography, ecology, toxicity, demographics, economics, and other types of information. Economic data, for example, enhance PRTR analyses by business sector, while demographic data assist in priority-setting and decision-making processes. Local community contexts, ranging from demographics and school locations to information on sewage and water treatment capabilities as well as details of land use—are especially important for many applications of PRTR data. Chemical/physical properties, health and environmental effects, and information on the fate and transport of a substance in the environment can provide important information for putting PRTR data in context. Information on common uses of reportable substances, their role in industrial processes, and their likely presence in products represents another category of contextual information.

Contextual information can be especially valuable for establishing the particular significance of PRTR data in local or regional conditions. Overlaying facility locations on watershed and airshed maps makes clear the potential influence the facilities' releases may have on the environment. Information on the persistence of chemicals in environmental media and their tendency to bio-accumulate through the food chain can aid in assessing such releases. Stream flow data are essential to understanding the movement of pollutants discharged to rivers; equally important here is information on the environmental fate of the pollutants—does a particular substance settle quickly to the river bottom, evaporate to air, persist in water as it travels far downstream? These examples also suggest the potential value of considering information (usually from other government agencies) on non-PRTR substances emitted to air or to surface waters in conjunction with PRTR data.

Among the most keenly sought contextual data for PRTRs is information on the toxicity and hazard of listed chemicals. PRTR data providers and data users alike have focused increasing attention on such information in recent years. Health effects data and descriptions of toxicity can boost the applicability of chemical-specific release data reported to PRTRs, but data needed to fully characterize the risks a chemical pose to human health and the environment following its release may not be available. Governments may refer audiences to reliable sources or gather and supply this information themselves.

Types of contextual information that are used with PRTR data:

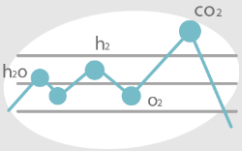
Geographic, Economic and Demographic



Production

Land use

Toxicity and impact on human health and the environment



Chemical or physical properties

Industry observers are among those who have called for information on the toxicity and health effects of PRTR-listed substances to be provided as context when PRTR data are disseminated. Most governments make efforts to supply such information or to point data users to reliable sources of such information. As noted in Annex 1, some companies are now publishing their environmental report data with toxicity weightings. These weightings help them set priorities for pollution prevention and reduction activities. Governments and other PRTR data disseminators may provide additional analyses that “normalise” data for production levels (often reported to PRTRs as a production index or ratio, comparing the current and previous years). It is important to note that these are supplemental analyses. Production-adjusted data do not allow tracking of progress toward policy goals. In publishing their own environmental reports, corporations often choose particular contexts in which to place their environmental data. Many recast their release data in relation to production volumes, publishing only, or principally, production-related release data; these may be expressed in per unit of production or totals may be adjusted by a production index.

VIII. Making PRTR data accessible to the public

There are several options a country may consider when designing mechanisms to disseminate PRTR data to stakeholders. Data from PRTRs are shared with public audiences primarily through four types of media:

1. PRTR websites;
2. Direct data access (online);
3. Printed publications;
4. Electronic devices (e.g. mobile app, USB flash drivers, etc.)

These four options are not mutually exclusive: a PRTR dissemination plan could include different media at the same time to be more effective, nonetheless, costs will inevitably affect the choice of dissemination options.

National strategies on how to make PRTR data available to the public can differ substantially from one country to another.

Countries may choose to make their complete PRTR database accessible via direct on-line access, while publishing summary reports both on the Internet and in printed formats. Authorities in charge of PRTR data management may use the Internet to give the public only aggregated data, and make specific subsets of raw data available upon request. Annual printed reports that summarise PRTR data will often be made available on the Internet as Acrobat PDF files to be downloaded directly from the websites and read on-screen or printed locally by any interested web visitor.

For governments with very limited resources, printed publications may be the primary tool for disseminating PRTR data. Simple and inexpensive printed materials can be easily and effectively used to promote the availability of PRTR data. For example, flyers and brochures can be used to promote access and knowledge of how to find PRTR data, whether the data are web-based, printed, or on USB flash drivers.

An increasing number of companies are placing their PRTR data on company web sites. Industry associations as well, often disseminate summary reports of their PRTR data and annual environmental reports with PRTR data included.

For example, members of the Chemistry Industry Association of Canada (CIAC), began to voluntarily report their environmental emissions under the Responsible Care Codes in

1992 with the aim to “do the right thing and be seen to do the right thing.” Responsible Care covers all aspects of a company's business, over the entire life cycle of its products: it requires companies to engage with plant-site neighbors, communities along transportation corridors, emergency responders, critics, and governments at all levels, to advance laws and regulations supporting sustainability.

Another example is one of the United States Environmental Protection Agency’s (EPA’s) first voluntary programs, the 33/50 Program. Initiated in1991, the 33/50 Program used the (then) newly established Toxics Release Inventory (TRI) to measure the nation’s progress towards reducing release quantities and quantities sent off-site for waste management of select chemicals by facilities subject to TRI reporting requirements. The primary goals of the 33/50 Program were to obtain a national 33% reduction in on-site releases and transfers off-site (for treatment and disposal) of 17 targeted TRI chemicals by 1992, and a 50% reduction nationally by 1995. The Program was initiated in February of 1991 and reductions were compared to a baseline year of 1988. A secondary goal of the program was to demonstrate that voluntary chemical reductions could be achieved more quickly than through traditional regulations alone. Under the 33/50 Program, industry partners were successful in achieving 33% and 50% national reductions in releases and transfers of the 17 target chemicals by 1992 and 1995, respectively. The goal of 50% reductions by 1995 was met a year early and continued to be reduced to 55% in 1995 and to 59.9% in 1996. Compared to all other TRI chemicals, those targeted by the 33/50 Program achieved greater reductions in releases and transfers during and after the timeframe of the Program. During the duration of the Program, releases and transfers of the 33/50 chemicals were reduced by 47% while releases and transfers of other TRI chemicals were only reduced by 25%. After the Program ended in 1995, reductions in release and transfer quantities of 33/50 chemicals continued (11% reduction from 1995-1996) while release and transfer quantities of other TRI chemicals had almost no decrease over the same time period (0.04% reduction from 1995-1996).

The table below (OECD, 2014) summarize the different approaches to the dissemination of PRTR information by the most advanced PRTR systems.

PRTR Systems Employing options						
Option	Australia NPI	Canada NPRI	E-PRTR	Japan PRTR	US TRI	Kiev Protocol
Level of Aggregation						
Individual Facilities and chemicals	✓	✓	✓	✓	✓	✓ *
Aggregate records	✓	✓	✓	✓	✓	✓ *
Format						
Summary and interpretative reports	✓	✓		✓	✓	✓ *
Raw data files/databases		✓	✓	✓	✓	
Analytical tools	✓	✓	✓	✓	✓	✓ *
Press releases			✓	✓	✓	✓ *
Fact sheets	✓			✓	✓	
Exports for integration with other PRTRs	✓	✓	✓	✓	✓	
Location						
Stand-alone website	✓		✓			✓ **
Webpage within national environmental authority		✓		✓	✓	✓ **
Websites providing international data	✓	✓	✓	✓	✓	
Public libraries					✓	✓ ***
Available upon request						✓ ***

** Recommended under the Kiev Protocol*

*** The Kiev Protocol does not distinguish whether a website should stand alone or fit within an environmental agency site*

**** Recommended under the Kiev Protocol if resources are not available for developing a website.*

For PRTRs that are under development, a key question may be the extent to which the government itself undertakes the dissemination and presentation of PRTR data, **not only making the data available to the public, but also educating the public to their meaning and use.**

Inform the public that PRTR data exists and is available online free of charge!

Efforts to promote widespread awareness of PRTR data and to encourage appropriate use of the data are important, regardless which methods a government adopts for disseminating the data. Some concrete examples of ways to enhance presentation and dissemination of data are as follow:

Marketing: let's create a buzz and spread the voice through a marketing campaign on national PRTR system!

Web-sites: create your PRTR website, it can be hosted within the national authority's website or it can be a separate domain.

Conferences: planning conferences to reach broader audiences, e.g. through press-conferences.

Workshops: hold technical workshops targeting specific audiences to make sure they are involved and informed about PRTR activities carried out in the country.

Trainings: organize specific trainings on how to read and interpret PRTR data for reporting industries, national authorities, media, public, NGOs.

Publicity: you can promote the national PRTR system with posters, flyers, stickers and other outreach materials.

Media: try to get the national media talking about the PRTR system, e.g. newspapers, TV news, articles and broadcasting.

Academia: universities, professors and researchers can use and improve the PRTR system through their daily studies and applications.

Education: you can use PRTR information for educational purposes, e.g. lessons or university courses on industrial pollution, air pollution, climate change can introduce the concept of PRTR and PRTR data to students from high school to university.

From past experiences, we have seen these ways to be very effective in creating awareness of PRTR systems, primarily because they can be customized and adapted according to national needs and resources, e.g. PRTR websites with GIS (Geographical Information System) interface are considered more interactive and easy to use, providing users maps and geographical distribution.

Since data needs and end uses vary among stakeholders, the most appropriate and efficient mechanism for dissemination, access, and use will vary. For example, concerned citizens may benefit most from simple fact sheets created by an environmental authority that summarize and interpret PRTR data reported by facilities near where they live or work. In contrast, researchers may benefit most from raw data files useful for many types of analysis. For PRTRs serving multiple stakeholder groups, multiple tools for accessing and using the data may be needed. PRTR data also can be provided together with supplemental information such as guidance documents on how PRTR data should (or should not) be interpreted, regulatory information, hazard information (e.g. toxicity) and exposure information (OECD, 2013). Providing contact information (e.g. telephone number, e-mail, online form for inquiry) with published datasets, documents, or analytical tools may also be considered to collect feedback from data users.

IX. Institutions in charge of the dissemination of data

At national level, we usually identify two main actors responsible for the dissemination and communication of PRTR data:

- **National Institutions**, e.g. ministries, governmental agencies, who also oversee the collection and management of reported data; and
- **Non-Governmental Organizations** (NGOs), who can assist the government in the awareness raising campaign aimed at fostering knowledge on the meaning and existence of the national PRTR.

Over time, the interaction of governmental and non-governmental disseminators has helped to make PRTR information more widely disseminated and used. Other distributors of PRTR data include intergovernmental bodies, industry groups, individual corporations, academia, state/provinces and local communities.

X. Conclusion

Through this factsheet we have learned that developing an effective PRTR dissemination strategy will depend on the relationship of the PRTR's goals with the data collected, the format of the data made available, and contextual data.

Providing contextual information, education and training concerning the meaning and use of data is crucial for a fully effective PRTR system.

Regarding challenges and difficulties that may occur, they are mostly related with accuracy and timeliness of data: once data are annually collected it may takes some time to verify and publish the data, especially in the first years/cycles of reporting once the process is assimilated the future reports will be developed more smoothly. Another important challenge is to provide training on how to use and interpret the data and additional information on the thresholds and toxicity of substances: trainings will avoid misinterpretations of data by users.