# Guidance on the methodology for preparing inventories of emissions pursuant to Article 8 of the Minamata Convention on Mercury

## Background

Article 8 of the Minamata Convention on Mercury, which deals with emissions, sets out the obligation that "[e]ach Party shall establish, as soon as practicable and no later than five years after the date of entry into force of the Convention for it, and maintain thereafter, an inventory of emissions from relevant sources".

"Relevant sources" means a point source falling within one of the source categories listed in Annex D. A Party may, if it chooses, establish criteria to identify the sources covered within a source category listed in Annex D so long as those criteria for any category include at least 75 per cent of the emissions from that category. The source categories[1] listed in the Annex are:

- Coal-fired power plants
- Coal-fired industrial boilers
- Smelting and roasting processes used in the production of non-ferrous metals[2]
- Waste incineration facilities
- Cement clinker production facilities.

Paragraph 9 of Article 8 states that the Conference of the Parties shall, as soon as practicable, adopt guidance on the methodology for preparing inventories of emissions.

Many countries, as part of their preparation for implementation and ratification of the Convention, will also conduct an inventory of all mercury use, emissions and releases nationally. Parties may also prepare inventories under other articles of the Convention, such as articles 9 (a mandatory inventory of releases) and 19. These may involve processes distinct from those used for the inventory required under Article 8, but a party may choose to use the same methodology or consistent methodologies for all inventories.

A robust inventory will support parties in their domestic implementation of the Convention, and enable them to demonstrate the extent to which implementation is achieving the objectives of the Convention. For example, it will show to what extent they are achieving the objective set out in paragraph 6 of article 8, that is, that the measures applied by a party to existing sources[3] in accordance with paragraph 5 should achieve reasonable progress in reducing emissions over time. It will also contribute more broadly to enabling parties individually and collectively to fulfil the obligations under Article 21 (Reporting) and 22 (Effectiveness evaluation).

For the purposes of completeness, parties should include with their inventories information about emissions from all sources within the categories listed in annex D. This could be particularly useful to parties choosing to establish criteria under paragraph 2 (b) of Article 8, in helping them to determine that at least 75 per cent of the emissions from a category listed in Annex D are included within the category of relevant sources.[4]

## Steps to establish an emissions inventory

The basic methodology to establish an emissions inventory typically involves many or all of the following steps:

- Plan the approach for development of the emissions inventory, within available resources, and consider how to collect, handle and review data, including any quality control and quality assurance processes

[1] As of [*insert date when guidance is adopted*]

[2] For the purpose of this Annex, "non-ferrous metals" refers to lead, zinc, copper and industrial gold.

[3] "Existing source" is defined in paragraph 2 of Article 8

[4] Guidance on establishing criteria for paragraph 2 (b) is available in separate guidance.

- Collect existing emissions data as a useful starting point
- Identify relevant sources within each source category
- Establish facility-based emissions reporting requirements
- Collect the emissions reports from facilities on a periodic basis (e.g. annually)
- Develop a database to store the reported emissions data
- Facilitate analysis of the results
- Make the data publicly accessible and searchable.

Once it has been established, arrangements must be made to maintain and update the inventory, in line with paragraph 7 of Article 8.

The following sections provide guidance for parties on some of these steps.

## Initial steps: identifying the facilities

In preparing to implement the Minamata Convention, a party will develop a plan on how to develop the inventory, including how to collect, review and validate data. An initial step for the party may then be to identify the sources of mercury emissions present within its territory, and also to identify and collect any existing inventories. For the point source categories in Annex D, parties will need to identify the facilities within each of the point source categories present at the national level: once again, existing inventories may already have much of this information. This would be followed by the development of a quantitative inventory by collecting information from each facility considered to be a relevant source within the source category.

## Collection of emissions information from individual facilities

Parties will need to collect recorded or estimated data about the point source emissions from individual facilities covered by Article 8 over a defined time period. Typically, inventories are based on a calendar year, so emissions are calculated on an annual basis. The inventory under Article 8 is required within five years of the entry into force of the Convention for that party, the collection of data earlier than this date, however, would contribute to robust estimates.

The inventory should ideally be based on the direct measurement of point source emissions. This will produce the most robust estimates.

Where, however, direct measurement is not practicable, an alternative is to use emission factors. An emission factor is a representative value relating the quantity of mercury emitted to the activity level associated with the source (for example, the throughput of raw material). Other indirect measuring techniques, such as engineering estimates[5] or mass balance calculations can also be used in the absence of direct measurement.

Additional guidance on the measurement of mercury emissions may be found in the BAT/BEP guidance document, in the chapter on monitoring.

A Party could choose also to use a combination of approaches. Estimates using emission factors may provide a better estimate of emissions for a category of sources rather than for any individual sources. It may be particularly useful for example to use aggregated emissions for sources which are too numerous or costly to monitor individually, or where individual reporting would be too burdensome (such as small industrial boilers). The methodology may differ from one source category to another, and could even be different for different types of facility within a source category. A combination of approaches may be particularly useful if a Party is defining criteria to identify relevant sources in accordance with paragraph 2 (b) of Article 8.

There are advantages in progressively adopting new and more accurate methods, for example, replacing data based on estimation techiniques with actual montored data as they become available, or replacing generic emission factors with factors which are more representative of the circumstances in a party's territory or at a specific source. At the same time, however, maintaining comparability between data obtained over time, so that trends in controlling

[5] For example, as described in section 2.5.4 of the chapter on monitoring in the BAT/BEP guidance document.

emissions are clear, is also necessary for the purposes of tracking progress in reducing emissions.

Parties may wish to establish policies and procedures about how methodological changes are introduced and how frequently this is done, and have arrangements in place where possible to help identify which changes over time are the result of real changes in emissions and those which reflect improvements in estimating techniques.

Where no national approaches are in place, parties may find it useful to adopt the methodologies set out in international guidance, such as the UNEP Toolkit[6] or the guidance prepared by the Economic Commission for Europe on the reporting of emission data under the Convention on Long-range Transbounday Air Pollution.[7]

In practice, the decision on the methodology to be used should be based on a combination of factors and may change over time, reflecting what is practical and affordable and what is most suitable in the light of national circumstances. At a minimum, however, there should be transparency about the methodology being used, so that the information in the inventory can be correctly intrepreted.

Where the information can practicably be obtained, it is useful to record details of the speciation of the emissions – that is, whether the mercury is in gaseous form or attached to particulates. This information may be useful in mathematically modelling the transport and fate of mercury air emissions.

Once the national methodology or methodologies have been established, parties should provide specific guidance to facilities on the estimation methods to be used, quality control and quality assurance considerations, and the format for data submission

## Development of an emissions inventory database

To facilitate reporting, a party could set up a dedicated emissions inventory website to disseminate information, thus enabling industries to download the relevant guidance materials, including reporting templates. Industries should be encouraged to submit their reports in an electronic format, to allow for easier data manipulation and analysis. Parties should require facilities to meet fixed reporting requirements and timelines.

Parties should create internal databases to store facility information (such as the facility's name, location, corporate ownership and other details) and the reported emissions data. This database should be searchable, easy to manipulate and conducive to further data analysis.

## Making the data publicly accessible and searchable

Individual facility emissions data and emissions summary reports containing non-confidential information, as well as the methodologies or monitoring methods used, should be made available to the public, consistent with the parties' obligation under Article 18 (Public information, awareness and education). If a Party has set up a website to assist industries in reporting their emissions, the same website could be used to disseminate the emissions data, subject to suitable security arrangements to protect the data. The website should allow users to conduct customized data searches, such as for an individual facility, industrial sector, geographical region, or a specific reporting year.

Where a Party has established a pollutant release and transfer register (PRTR) covering several pollutants, data about point source mercury emissions – including from Annex D sources –are likely to be included. The data search should make it possible to identify and easily obtain data about point source mercury emissions.

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[6] UNEP Toolkit for Identification and Quantification of Mercury Releases, available at: http://www.unep.org/chemicalsandwaste/Metals/Mercury/Informationmaterials/GuidanceTrainingMaterialToolkits/MercuryToolkit/tabid/4566/Default.aspx

[7] Guidelines for Reporting Emission Data under the Convention on Long-range Transboundary Air Pollution (ECE/AIR/97), available at: http://www.ceip.at/fileadmin/inhalte/emep/reporting_2009/Rep_Guidelines_ECE_EB_AIR_97.

More information on the establishment and implementation of PRTRs may be found at the website PRTR.net,[8] which is developed and maintained by the Organization for Economic Cooperation and Development (OECD), in cooperation with the Economic Commission for Europe and the UNEP collaborating centre GRID-Arendal. The guidance from the Economic Commission for Europe on implementing the Protocol on Pollutant Release and Transfer Registers[9] also contains useful recommendations on developing emissions inventories.

It should be noted that the PRTRs may have thresholds for reporting, under which facilities emitting less than the threshold have no obligation to report.

## UNEP Inventory Toolkit

UNEP has developed a set of tools, consistent with the above methodology, for use in establishing inventories. This UNEP toolkit could be a good starting point for parties developing their own emissions inventories. The toolkit potentially covers all sources of mercury emissions and releases to all environmental media, but, to meet the requirements of Article 8, it can also be used to establish more limited inventories covering the point source emissions to the atmosphere from relevant sources under Annex D. Over time, parties should strive to improve and develop their emissions inventories, and the guidance outlined above provides a basis for such an undertaking.

The toolkit is available at two levels: inventory level 1 and inventory level 2.

Inventory level 1 uses factors derived from experience for input and releases to calculate mercury inputs and releases to all environmental media, and presents results as estimates.

Inventory level 2 aims to lead countries through the process of enhancing and refining their initial inventories. It provides guidance on the different techniques and stages of developing the inventory, and includes illustrative examples and extensive information on mercury release sources. It provides a simple methodology, together with an accompanying database to ensure consistency in the development of national inventories.

The methodology for level 2 aims for the identification and quantification (where possible) of all sources of emissions and releases of mercury at the national level. The first step is the establishment of a screening matrix, with an identification of the main source categories present. A party could choose to limit the sources to those source categories listed in Annex D. The second step is the classification of the main source categories into subcategories, to identify individual activities that potentially release mercury. This produces a qualitative identification of source types. The third step involves the development of a quantitative inventory. For a detailed quantitative inventory, activity volume data and process-specific information are gathered and may then be used to calculate estimated mercury releases from the identified sources. The toolkit contains procedures and equations for the calculation of all emissions and releases.

As a final stage, the results of the inventory are compiled. The toolkit recommends the use of a standardized presentation format, which ensures that all known sources are considered (whether they are quantified or not). This allows any data gaps to be revealed, and assists in ensuring that inventories are comparable and transparent. It also provides an opportunity to review, over time, changes in the national emissions and releases of mercury from all sources. This quantitative review conducted under level 2 would contribute to reporting requirements under paragraph 11 of Article 8.

[8] http://www.prtr.net/en/.

[9] United Nations Economic Commission for Europe, *"Guidance on Implementation of the Protocol on Pollutant Release and Transfer Registers"*, 2008. Available at: http://www.unece.org/env/pp/prtr.guidancedev.html.