


Inventory of sources and quantification of releases from unintentional production

Stockholm Convention on Persistent Organic Pollutants

Stockholm Convention Secretariat
United Nations Environment Programme
Geneva, Switzerland




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Background

During many anthropogenic activities, as undesired side effect, persistent organic pollutants may be **unintentionally produced and released**

These are subject to the requirements of **Article 5 and Annex C** of the Stockholm Convention

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Why do we need release inventories?

- To inform the policy makers and the public
- To define environmental priorities and identify the activities and actors responsible for the problems
- Set explicit objectives and constraints
- Assess the potential environmental impacts and implications of different strategies and plans
- Evaluate the environmental costs and benefits of different policies
- Monitor the state of the environment to check that targets are being achieved
- Monitor policy action to ensure that it is having the desired effect
- Monitor compliance with the international obligations

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Release inventories under Article 5

- Parties are required to **identify, characterize, quantify and prioritize** sources of releases of Annex C chemicals; and
- to develop strategies with timelines and goals to minimize these releases;
- to **evaluate** effectiveness of these strategies and their success in minimizing releases of Annex C POPs every five years and to **report such reviews** in reports submitted pursuant to Article 15

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Attributes of release inventories

The inventory data should be:

- **Reliable**
- **Consistent over time**
- **Comparable between countries**
- **Transparent**
- **Complete**

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Criteria on data quality



- For **reliable** inventories internationally acknowledged methodology and best available national information should be used
- To achieve **consistency over time** the same methodology should be used by country over time to establish time trends
- To ensure **comparability between countries** all countries should use the same methodology and source categorization for a specific pollutant or group of pollutants
- For **transparent** estimates the information, methodology and assumptions used should be clearly described and explained
- For **complete** release inventories all relevant source categories have to be considered

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How to meet these criteria?



- Follow internationally agreed and suggested methods and use the best available national data to apply them
- **Harmonized framework for elaboration of comparable release inventories of Annex C chemicals**
The Standardized Toolkit for Identification and Quantification of Dioxin and Furan Releases (Toolkit)

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History



- POPs team of UNEP Chemicals developed Toolkit since 1999
- Draft-2001, 1st ed-2003, 2nd ed-2005
- COP in its Decision SC-2/5
 - Welcomed the 2nd edition of the Toolkit (2005)
 - Recognized its potential as the guidance for undertaking release inventories pursuant to Article 5
 - Noted requests from parties and others to verify emission factors, address gaps and further improve the Toolkit
- Requested the Secretariat to initiate an open transparent process, in cooperation with UNEP Chemicals and consultation with users and experts to develop further the Toolkit
- Invited parties and others to provide relevant information

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Present status



- **Decision SC-3/6 among other things:**
- Took note of the Toolkit Expert Roster
- Adopted the process for the ongoing review and updating of the Toolkit (annex to decision SC-3/6)
- Requested the Secretariat to implement the process and report on progress to COP-4
- Adequate emphasis be placed on the key sources for which limited monitoring data is available, including sources of hexachlorobenzene and polychlorinated biphenyls, and to support developing countries in their efforts to further verify their emission factors
- **Decision SC-4/7 reinforced the process as adopted**

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Key ongoing activities



- Two Toolkit Expert Meetings (2007, 2008)
- Projects to verify /establish EF for open burning of waste and open burning of biomass
- Household heating and cooking
- Screening activities on sources typical for developing countries (simple stoves, brick kilns, charcoal production, artisan metal production)

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Toolkit methodology



- All international inventory systems, including the Toolkit, use the following basic equation:
emission factor x activity rate = emissions per year
- Each of the systems identifies:
 - Pollutants of interest
 - Relevant source categories
 - Appropriate activity data
 - Default sets of emission factors (reflecting different technique levels)
 - Related guidance (data reporting, validation, QA/QC...)

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Current Toolkit use

- PCDD/F releases reported in 85 of 89 (out of 137 due by 12 08) submitted NIPs;
 - 65 used the Toolkit
 - 10 used the Toolkit along with other information
 - 10 CLRTAP methodology
- PCDD/F releases reported in 30 of 43 (out of 154 due by 06 08) submitted national reports
 - 24 used the Toolkit
 - 2 used the Toolkit along with other information
 - 4 CLRTAP methodology

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Conclusions

- The Toolkit is broadly used by developing countries
- CEE countries are usually using the Toolkit along with other information sources or reporting only according to the CLRTAP method
- Developed countries usually use multiple information sources, including measurements
- CLRTAP Parties report usually according to the CLRTAP method
- To obtain comparable data the EC inventory of PCDD/F for the new member states was largely based on the Toolkit methodology

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Issues of concern

- Weak reporting of PCDD/F releases
- Reported data are still not fully comparable, consistent, transparent and reliable
- Forthcoming inventory revisions and updating
- Projections

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Base of release inventories

- Emission factor is the amount of release per unit of activity: it establishes a **correlation** between the volume of activity and the total amount of releases
- Emission factor examples:

mg of pollutant / ton of product	Activity rate: yearly production in tons
mg of pollutant / GJ produced	yearly energy production in GJ
mg of pollutant/ton of raw material	yearly raw material cons. in tons
- | | |
|---------------------------------------|-----------------------------|
| mg of pollutant / capita / year | number of inhabitants |
| mg of pollutant / square km / year | relevant area in square km |
| mg of pollutant / installation / year | number of relevant install. |

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Default emission factors

- Default emission factors are based on a great number of specific emission factors, which are usually based on exact measurements under identified conditions
- Default emission factors therefore reflect an average situation and are applicable also in other countries under similar conditions

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Inventory revisions, updates and projections

How to do them???

- Use the same basic equation and methodology as for the inventory :

$$\text{emission factor} \times \text{activity rate} = \text{emissions per year}$$

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Terms



Updates

Establishing emission trends over a time period

Revisions

Recalculation of inventories using new (better) data

Projections

Projections (forecasts) of future emissions

How to do updates/time trends



- Use the same methodology to calculate the releases for the following years
- Adjust the activity rate according to the situation in the actual year
- In case of change in technology, raw material, abatement technique or other key parameter which could have influence on release strength, change also the emission factor
- May be used also to calculate emissions in the past

How to do revisions



- Inventories may be revised as necessary and appropriate in case of:
 - Major changes in methodology
 - Better/new emission factors
 - New information/knowledge on country level
- The whole time series must be revised in order to maintain consistency of the data
- Inventory revisions have to be documented and reported

How to do projections



- Use the same methodology to calculate the emission forecasts
- Make assumptions of the future activity rates
 - Based on expected GDP grow
 - Based on production plans of the particular plant/sector
 - Based on expected socio-economic development
- Use appropriate emission factors based on planned/expected change in technology, raw material, abatement technique or other key parameter which could have influence on release strength
- May be used also to calculate different scenarios

Difficulties encountered by the countries



- General lack of awareness about the POPs problem
- Estimation of activity data for uncontrolled combustion
- Lack of supportive legislation (collecting of activity data; PCBs equipment inventory)
- Difficulties to quantify the pollution of hot spots by POPs
- No availability of emission factors and of a Toolkit for other POPs, besides dioxins and furan

Reporting



- Information on releases of unintentional POPs should be classified in a consistent manner, for example by using the source categories in the *Standardized Toolkit for Identification and Quantification of Dioxin and Furan Releases*.
- Consistency in the methods for compiling the source inventories and release estimates has to be maintained overtime.
- Changes in the scope of the inventory would need to be reflected in the data presented (e.g. if a new category of sources is identified, better emission factors become available, or better information on levels of activity data are obtained, this change should be applied also to the estimates of previous years)

For further information
www.pops.int



Stockholm Convention
 on persistent organic pollutants (POPs)

Rotterdam and Stockholm Conventions
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Annex C Part I

This Annex applies to the following persistent organic pollutants when formed and released **unintentionally** from thermal processes involving **organic matter and chlorine** as result of:

incomplete combustion
 or
chemical reaction

- **Polychlorinated dibenzo-p-dioxins and dibenzofurans (PCDD/PCDF)**
- **Hexachlorobenzene (HCB)**
- **Polychlorinated biphenyls (PCB)**
- **Hexachlorobenzene**

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Annex C- Part II Source categories

Source categories having the potential for comparably high formation and release of chemicals listed in Annex C:

- Waste incinerators, including co-incinerators of municipal, hazardous or medical waste or of sewage sludge
- Cement kilns firing hazardous waste
- Production of pulp using elemental chlorine or chemicals generating elemental chlorine for bleaching
- The following thermal processes in the metallurgical industry:
 - **Secondary copper production**
 - **Sinter plants in the iron and steel industry**
 - **Secondary aluminium production**
 - **Secondary zinc production**

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Annex C - Part III Source categories

- Open burning of waste, including burning of landfill sites
- Thermal processes in the metallurgical industry not mentioned in Part II
- Residential combustion sources
- Fossil fuel-fired utility and industrial boilers
- Firing installations for wood and other biomass fuels
- Specific chemical production processes releasing unintentionally formed persistent organic pollutants, especially production of chlorophenols and chloranil
- Crematoria
- Motor vehicles, particularly those burning leaded gasoline;
- Destruction of animal carcasses
- Textile and leather dyeing (with chloranil) and finishing (with alkaline extraction)
- Shredder plants for the treatment of end of life vehicles
- Smouldering of copper cables
- Waste oil refineries

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