

COST Action 633

Working Group 3: Sources, Emissions, Modeling, Economic Aspects
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EMISSION INVENTORIES AND SOURCE APPORTIONMENT STUDIES IN FINLAND

The titles below are as agreed in the COST-633 meeting in Ispra, 2004

1a. Emission inventories

A) Finnish Ministry of the Environment keeps records of the Finnish emissions. Most large factories and power plants are obliged to give information about their emissions. Large part of this information is sent directly to proper EU officials. Some information can be found in English on the web pages of this Ministry:

-CLRTAP inventory: <http://www.ymparisto.fi/default.asp?node=13256&lan=en>

-Air pollutant emissions: <http://www.ymparisto.fi/default.asp?contentid=80911&lan=EN>

B) Helsinki Metropolitan Area Council publishes (mostly in Finnish) emission inventories for the Helsinki area: <http://www.ytv.fi/>

Total emissions for SO₂, NO_x, CO, CO₂, VOC and particles are considered. There is discussion about the estimated contributions from road traffic, ships, air traffic, energy production and from working machines.

C) There is also some publications about specific size-segregated particulate emissions:

Kauppinen E.I. and Pakkanen T.A. (1990) Coal combustion aerosols: a field study. *Environ. Sci. Technol.* **24**, 1811-1818.

Kauppinen E.I. and Pakkanen T.A. (1990) Mass and trace element size distributions of aerosols emitted by a hospital refuse incinerator. *Atmos. Environ.* **24A**, 423-429

Kerminen V.-M., Mäkelä T., Ojanen C., Hillamo R., Vilhunen J., Rantanen L., Havers N., von Bohlen A. and Klockow D., 1997. Characterization of the particulate phase in the exhaust from a diesel car. *Environmental Science and Technology* 31, 1883-1889

1b. Source apportionments: methods and models available

See 1c.

1c. Source apportionment results

A) Most source apportionment studies carried out in Finland utilized various factor analysis methods:

Atmospheric Environment 1999, 3821-3829

Atmospheric Environment 2003, 615-623

The Science of the Total Environment 2004: In press

B) Analysis of the average chemical composition of particles allows the use of a chemical mass closure model for estimation of aerosol sources (Atmospheric Environment 2001, 5381-5391).

C) In addition there are a number of qualitative source estimations based on mass size distributions (Atmospheric Environment 2001, 5537-5551) and/or correlations between different chemical components (Atmospheric Environment 2001, 5381-5391; Atmospheric Environment 2003, 1673-1690). Mass size distributions of 30 chemical components and particulate mass have been used for qualitative source estimations in the ultrafine size range (PM_{0.1}) (Atmospheric Environment 2001, 4593-4607).

1d. Process studies, validation of models

In Finland there are some research groups that study the dynamics of various atmospheric physical and chemical processes.

1e. Collecting modeling results

1f. Integrated assessment models (economic aspects)

2. Review and categorization

3. Gaps, future research and recommendations

- in order to use the chemical mass balance method (CMB) fingerprints for different emission sources are needed.