



UNSD/UNEP QUESTIONNAIRE 2004 ON ENVIRONMENT STATISTICS

Section: AIR

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Section: AIR

GUIDANCE

INTRODUCTION

The data collection is a joint activity between the United Nations Statistics Division (UNSD) of the Department of Economic and Social Affairs (DESA) and the United Nations Environment Programme (UNEP). It contributes to the development of the UNSD International Environment Statistics Database. The data will be analyzed and consolidated by UNSD for use in international work, in particular for UNEP's Global Environmental Outlook, and will be made available to countries, United Nations specialized agencies and other regional and international organizations, as well as to the general public.

This section deals with air pollution and ambient air quality. Emissions of pollutants affect local air quality directly and contribute to regional and global environmental problems such as acidification, eutrophication and climate change.

Air emissions data are usually estimated according to international methodologies on the basis of national statistics on energy balances, industrial and agricultural production, waste management and land use, etc. The most accepted and well-known methodologies are the revised 1996 Guidelines of the Intergovernmental Panel for Climate Change (IPCC) (see <http://www.ipcc-nggip.iges.or.jp/public/gl/invs4.htm>) which is the basis for reporting to the United Nations Framework Convention for Climate Change (UNFCCC) (see: <http://unfccc.int/index.html>). These are linked to the UNECE EMEP/CORINAIR Atmospheric Inventory Guidebook (see http://reports.eea.eu.int/EMEPCORINAIR3/en/tab_abstract_RLR).

When available, tables have been pre-filled with data from the responses to the UNSD Questionnaire 2001 and from the UNFCCC. Please note that countries that regularly report their data on emissions of CO₂, CH₄, N₂O, SO₂, NO_x and NM-VOCs to the UNFCCC do not need to send their respective data to UNSD as they will be directly available from the UNFCCC.

Definitions for the pollutants and source categories can be found immediately before the tables in the Definition Sheet.

Air Emissions

Air emissions predominantly arise from the combustion of fossil fuels, mainly from transport activities, power plants, refineries and other kinds of fuel combustion activities. These activities generate a large variety of air pollutants of which carbon dioxide (CO₂), sulfur dioxide (SO₂), nitrogen oxides (NO_x) and non-methane volatile organic compounds (NM-VOCs) are among the most significant ones. Industrial processes and agriculture also contribute to the emissions of the above-mentioned pollutants as well as to emissions of other greenhouse gases such as nitrous oxide (N₂O) and methane (CH₄). Transport and the metal industry are the main sources of lead (Pb) emissions. Transport and energy production facilities are furthermore the main factors affecting ambient air quality in cities.

Table	Pollutant	Primary concern:
A1	Sulfur Dioxide (SO ₂)	Acidification
A2	Nitrogen Oxides (NO _x)	Acidification, Eutrophication, Formation of ground level ozone and indirectly to climate change
A3	Non-Methane Organic Compounds (NM-VOCs)	Ground level ozone, climate change
A4	Carbon Dioxide (CO ₂)	Climate change
A5	Methane (CH ₄)	Climate change, Formation of ground level ozone
A6	Nitrous Oxide (N ₂ O)	Climate change
A7	Lead (Pb)	Dispersion of toxins

NOTES ON TABLES: A1-A7

- For those tables related to Air Emissions, except for Lead, the source specifications of the Revised IPCC Guidelines 1996 on National Greenhouse Gas Inventories have been used and aggregated for the purposes of this Questionnaire (see <http://www.ipcc-nggip.iges.or.jp/public/gl/guidelin/ch1ri.pdf>).

- The tables ask for the annual volume of emissions in either thousands of tons or million of tons, not a weighted global warming potential (GWP).
- In the case of CO₂, the category 'other sources of emissions' does not include emissions from biomass burning or emissions or removals from the land-use change and forestry sector.

• **Changes from the UNSD Questionnaire 2001 on Environment Statistics:**

- The 2001 Questionnaire requested that fugitive fuel emissions be reported under 'energy industries'. To keep with UNFCCC categories, fugitive fuel emissions can now be separately placed in the category 'Fugitive emissions from fuels'.
- The table on Lead emissions has been modified to better reflect the sources.

Ambient Air Quality

NOTES ON TABLES: A9-A11

- These tables ask for air quality trends in terms of annual mean concentrations of Sulfur Dioxide (SO₂), Nitrogen Dioxide (NO₂), and Suspended Particulate Matter smaller than 10 µm in diameter (SPM₁₀) in ambient air. Each of the three tables asks for air quality trends measured in urban and industrial settlements as well as at background stations. The table further asks for station location and type where multiple stations can be reported within a settlement. The suggested criteria for selection of the **settlement** are as follows:

Urban City	The largest city (by population) in the country OR a city in which a notable portion (5-10 percent) of the national population is concentrated.
Industrial City	A city where a significant number of inhabitants have been exposed to high levels of industrial pollution.
Background Site	An area remote from both industrial activities and high populations densities.

And, the suggested criteria for the selection of **stations** are as follows:

City/urban centre	An urban location representative of general population exposure in towns or city centers, e.g. pedestrian precincts and shopping areas.
Urban background	An urban location distanced from sources and therefore broadly representative of city-wide background conditions.
Suburban/residential	A location type situated in a residential area on the outskirts of a town or city.
Curbside/near road	A site sampling within 1-5 meters of a busy road.
Industrial	An area where industrial sources make an important contribution to long-term or peak concentrations.
Rural	An open countryside location distanced as far as possible from roads, populated and industrial areas.

(Source: World Health Organization (WHO) see: http://www.who.int/environmental_information/Air/Guidelines/Chapter5.htm)

- Please select stations with long time series data as much as possible.
- Please be sure to note in the Supplementary Data Sheet the type of station where monitoring occurred according to the above classification system.
- If you have air quality data on another area type which does not fit within the above classification, please add the appropriate information to the Supplementary Data Sheet.
- The recommended annual data completeness criteria would be for the site to collect at least 50% of its scheduled number of annual observations. For example, if the measurement device is a 24-hour bubbler with a scheduled sampling once every six days or 60 observations per year, then the minimum number of samples for the annual data completeness criteria would be to collect at least 30 observations. Data should then be compiled in order to calculate an annual mean.
- Since sampling frequency could vary each year, please indicate the number of samples taken on an annual basis in the footnote space provided.
- Please specify the analytical method of air quality monitoring used in the column entitled "Analytical Method" and provide information on the frequency of sampling and the number of observations in the Supplementary Information Sheet. For Table 11 (Suspended Particulate Matter), if Total Particulate Matter (TPM), including particle sizes between 1-50 μm , is monitored instead of SPM_{10} , please provide the corresponding data and indicate it in the footnotes.

STEPS TO FOLLOW

- Fill in the contact information at the top of each table.
 - Check the pre-filled data and, if required, kindly update it in the table. Please note that tables are pre-filled from two different sources and that the pre-filled data are sometimes contradictory. The source for the pre-filled data is coded in the second column after the data. The following data sources were used:
 - UNFCCC 2002 database (Coded 11)
 - UNSD Questionnaire 2001 (Not Coded)
- If both UNFCCC and UNSD 2001 data were available, the prefilling was done with UNFCCC data.
- Fill in the requested variables with data in accordance with the definitions provided (see the Definitions Sheet). If a different definition or methodology has been used, please explain the differences in a footnote (see below) or provide the definition and/or methodology applied in the supplementary information sheet.
 - If data are not available for the years stated in each table, please provide the data you might have for other years and add a footnote for the years to which the data apply.
 - Use footnotes to give additional information on data. For this purpose, use the first column after the data for an alphabetical code, and write your explanatory text in the footnote text column, preceded by the code of the footnote. Check also pre-filled footnotes and correct them if necessary.
 - Please distinguish between 'data is not available', in which case the field should be left blank, and 'data is zero', in which case the field should be filled with a "0".
 - Please report data in the requested unit. A conversion matrix is provided.
 - Please note that the exclamation mark in the first column of each table indicates high priority data for international work. In the event that complete data are not available from your country, please make efforts to submit data for those variables marked as priority.
 - Please note that the use of indentation in the category column of each table indicates which variables are subsets and which variables are totals.
 - Do not hesitate to attach any documents or reference which could help UNSD to interpret your data.
 - Please deliver all suitable data you have available.
 - If you have any questions, do not hesitate to contact Ulrich Wieland at UNSD, e-mail: wieland@un.org, tel. +1 917 367 4201, fax +1 212 963 0623.

CONVERSION TABLE

1ppb SO ₂	2.66 µg/m ³ SO ₂
1ppb NO ₂	1.91 µg/m ³ NO ₂

PREFIXES AND MULTIPLICATION FACTORS

Abbreviation	Prefix	Symbol
10 ¹²	tera	T
10 ⁹	giga	G
10 ⁶	mega	M
10 ³	kilo	k
10 ²	hecto	h

Section: AIR

List of Definitions

	DEFINITIONS
Emission sources	The classification of emission sources used in this questionnaire is based on the Revised IPCC 1996 Guidelines for National Greenhouse Gas Inventories.
Total emissions	Emissions from human activities in the country. Please note that emissions from international aviation and maritime transport are excluded.
Energy activities [Production and Use]	This category comprises all emissions related to the production and use of energy in any sectors of the economy and households. It includes emissions from fuel combustion as well as fugitive fuels. This variable corresponds to IPCC category 1.
Fuel combustion	Emissions caused by the burning of fossil fuels in any process. It comprises the combustion of fuels in the energy industries, all other industries and transport; it includes small combustion activities such as in commercial, institutional or residential buildings, fuel combustion in agriculture and in all other activities. CO ₂ emission from the combustion of biomass is excluded. This variable corresponds to IPCC category 1A.
Energy industries	Emissions from fuel combustion in public electricity and heat production, in petroleum refining, manufacturing of solid fuels and other energy industries. For the purposes of this questionnaire, fugitive emissions from fuels (coal mining, oil and gas fields, venting and flaring etc.) are not allocated to this category. Please note that evaporative emissions from vehicles are included under Transport. This variable corresponds to IPCC category 1A1.
Manufacturing industries and construction	Emissions from fuel combustion in manufacturing industries (except coke ovens that are allocated under Energy industries) and construction. If more disaggregated data by industrial activities according to International Standard Industrial Classification of All Economic Activities (ISIC)/Revision 3 are available, please provide them in the Supplementary Information Sheet. This variable corresponds to IPCC category 1A2.

	DEFINITIONS
Transport	<p>Emissions from fuel combustion in transport activities such as domestic air transport, road transport, railways, navigation and other transport. Evaporative emissions from vehicles are also included in this category. Please note that emissions from international aviation and marine transport are excluded. If separate data on emissions from road transport are available, please provide them in the Supplementary Information Sheet.</p> <p>This variable corresponds to IPCC category 1A3.</p>
Other fuel combustion	<p>Emissions from fuel combustion in commercial, institutional and residential buildings, agriculture, forestry, fishing and other non-specified fuel combustion (e.g. military). The fishing sector includes domestic inland, coastal and deep-sea fishing.</p> <p>This variable corresponds to the sum of the IPCC categories 1A4 and 1A5.</p>
Fugitive emissions from fuels	<p>Intentional or unintentional releases of gases from anthropogenic activities. In particular, they may arise from the production, processing, transmission, storage and use of fuels, and include emissions from combustion only where it does not support a productive activity (e.g., flaring of natural gases at oil and gas production facilities).</p> <p>The variable corresponds to the sum of the IPCC categories 1B1 and 1B2.</p>
Industrial processes	<p>Emissions from processes such as chemical industry, metal industry, production and use of mineral products and other industries. If more disaggregated data according to ISIC/Rev.3 are available, please provide them in the Supplementary Information Sheet.</p> <p>This variable corresponds to IPCC category 2.</p>
Solvent use	<p>Emissions from paint application, degreasing and dry cleaning, manufacturing and processing of chemical products, and other processes using solvents and other solvent based products.</p> <p>This variable corresponds to IPCC category 3.</p>
Agriculture	<p>Emissions from the breeding of livestock, rice cultivation, field burning of agricultural residues, prescribed burning of savannas and other agricultural activities.</p> <p>This variable corresponds to IPCC category 4.</p>

	DEFINITIONS
Other sources of Emissions	Emissions from waste water treatment, waste disposal on land, waste incineration, land-use changes, forestry and other activities which have not been covered above. This variable corresponds to the sum of the IPCC categories 5, 6 and 7.
Non-methane volatile organic compounds (NM-VOCs)	A group of solvent-like organic compounds that easily evaporate at normal temperatures. They are produced mainly in fuel combustion and in processes that use solvents or solvent-based products such as painting, metal degreasing etc. Several of these chemicals are harmful to human health if inhaled, ingested, drunk or get in contact with skin. NM-VOCs are significant precursors to ground level ozone formation. NM-VOCs are the sum of all hydrocarbon air pollutants except methane.
Suspended Particulate Matter (SPM₁₀)	Finely divided solids or liquids, less than 10 µm (micrometers), that may be dispersed through the air from combustion processes, industrial activities or natural sources.
Annual mean concentration	Arithmetic mean over all valid measurements for the respective year. If not available, please provide alternative measures such as the median value or estimates and indicate this in the footnotes.
Urban (largest) city	City of large(st) population. Indicate the name of the city and air quality monitoring stations and provide data for each station.
Industrial city	Industrial city in which a significant number of inhabitants are exposed to the highest level of industrial pollution. Please indicate the name of the city and the air quality monitoring stations.
Background site	A monitoring station remote from any industrial and densely populated area. Please indicate the name and location of the site.

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Country: _____
 Contact institution: _____

Contact person: _____
 E-mail: _____

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Table A1: Emissions of Sulfur Dioxide (SO₂)

Priority	Emission sources	Unit	1990	1995	1996	1997	1998	1999	2000	2001	2002
!	TOTAL emissions (1)=(2)+(3)+(4)+(5)+(6)	1000 t									
	Energy activities [production and use] (2)=(2a)+(2b)	1000 t									
	Total fuel combustion (2a)=(2aa)+(2ab)+(2ac)+(2ad)	1000 t									
	Energy industries (2aa)	1000 t									
	Manufacturing industries and construction (2ab)	1000 t									
	Transport (2ac)	1000 t									
	Other fuel combustion (2ad)	1000 t									
	Total fugitive emissions from fuels (2b)	1000 t									
	Industrial processes (3)	1000 t									
	Solvent use (4)	1000 t									
	Agriculture (5)	1000 t									
	Other sources of emissions (6)	1000 t									

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Table A2: Emissions of Nitrogen Oxides (NOx)

Priority	Emission sources	Unit	1990	1995	1996	1997	1998	1999	2000	2001	2002
!	TOTAL emissions (1)=(2)+(3)+(4)+(5)+(6)	1000 t									
	Energy activities [production and use] (2)=(2a)+(2b)	1000 t									
	Total fuel combustion (2a)=(2aa)+(2ab)+(2ac)+(2ad)	1000 t									
	Energy industries (2aa)	1000 t									
	Manufacturing industries and construction (2ab)	1000 t									
	Transport (2ac)	1000 t									
	Other fuel combustion (2ad)	1000 t									
	Total fugitive emissions from fuels (2b)	1000 t									
	Industrial processes (3)	1000 t									
	Solvent use (4)	1000 t									
	Agriculture (5)	1000 t									
	Other sources of emissions (6)	1000 t									

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Table A3: Emissions of Non-Methane Volatile Organic Compounds (NM-VOCs)

Priority	Emission sources	Unit	1990	1995	1996	1997	1998	1999	2000	2001	2002
!	TOTAL emissions (1)=(2)+(3)+(4)+(5)+(6)	1000 t									
	Energy activities [production and use] (2)=(2a)+(2b)	1000 t									
	Total fuel combustion (2a)=(2aa)+(2ab)+(2ac)+(2ad)	1000 t									
	Energy industries (2aa)	1000 t									
	Manufacturing industries and construction (2ab)	1000 t									
	Transport (2ac)	1000 t									
	Other fuel combustion (2ad)	1000 t									
	Total fugitive emissions from fuels (2b)	1000 t									
	Industrial processes (3)	1000 t									
	Solvent use (4)	1000 t									
	Agriculture (5)	1000 t									
	Other sources of emissions (6)	1000 t									

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Table A4: Emissions of Carbon Dioxide (CO₂)

Priority	Emission sources	Unit	1990	1995	1996	1997	1998	1999	2000	2001	2002
!	TOTAL emissions (1)=(2)+(3)+(4)+(5)+(6)	mio t									
	Energy activities [production and use] (2)=(2a)+(2b)	mio t									
	Total fuel combustion (2a)=(2aa)+(2ab)+(2ac)+(2ad)	mio t									
	Energy industries (2aa)	mio t									
	Manufacturing industries and construction (2ab)	mio t									
	Transport (2ac)	mio t									
	Other fuel combustion (2ad)	mio t									
	Total fugitive emissions from fuels (2b)	mio t									
	Industrial processes (3)	mio t									
	Solvent use (4)	mio t									
	Agriculture (5)	mio t									
	Other sources of emissions (6)	mio t									

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Table A5: Emissions of Methane (CH₄)

Priority	Emission sources	Unit	1990	1995	1996	1997	1998	1999	2000	2001	2002
!	TOTAL emissions (1)=(2)+(3)+(4)+(5)+(6)	1000 t									
	Energy activities [production and use] (2)=(2a)+(2b)	1000 t									
	Total fuel combustion (2a)=(2aa)+(2ab)+(2ac)+(2ad)	1000 t									
	Energy industries (2aa)	1000 t									
	Manufacturing industries and construction (2ab)	1000 t									
	Transport (2ac)	1000 t									
	Other fuel combustion (2ad)	1000 t									
	Total fugitive emissions from fuels (2b)	1000 t									
	Industrial processes (3)	1000 t									
	Solvent use (4)	1000 t									
	Agriculture (5)	1000 t									
	Other sources of emissions (6)	1000 t									

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Table A6: Emissions of Nitrous Oxide (N₂O)

Priority	Emission sources	Unit	1990	1995	1996	1997	1998	1999	2000	2001	2002
!	TOTAL emissions (1)=(2)+(3)+(4)+(5)+(6)	1000 t									
	Energy activities [production and use] (2)=(2a)+(2b)	1000 t									
	Total fuel combustion (2a)=(2aa)+(2ab)+(2ac)+(2ad)	1000 t									
	Energy industries (2aa)	1000 t									
	Manufacturing industries and construction (2ab)	1000 t									
	Transport (2ac)	1000 t									
	Other fuel combustion (2ad)	1000 t									
	Total fugitive emissions from fuels (2b)	1000 t									
	Industrial processes (3)	1000 t									
	Solvent use (4)	1000 t									
	Agriculture (5)	1000 t									
	Other sources of emissions (6)	1000 t									

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Table A7: Emissions of Lead (Pb)

Priority	Unit	1990	1995	1996	1997	1998	1999	2000	2001	2002
	Total mobile sources (1)	1000 t								
	<i>of which: road transport</i>	1000 t								
	<i>other mobile sources</i>	1000 t								
	Total stationary sources (2)	1000 t								
!	Total emissions (3)=(1)+(2)	1000 t								
	<u>Background information:</u> Average lead content of leaded petrol	g/l								
	Total consumption of leaded petrol	1000 t								
	Total consumption of lead-free petrol	1000 t								

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Table A9: Annual Mean Concentrations of Sulfur Dioxide (SO₂) in Ambient Air

Priority	Station Name (.....)	Analytical Method	Unit	Annual Mean Concentration										
				1990	1995	1996	1997	1998	1999	2000	2001	2002		
!	Urban city (.....)													
!	Station 1 (.....)		ug/m ³											
!	Station 2 (.....)		ug/m ³											
	Industrial city (.....)													
	Station 1 (.....)		ug/m ³											
	Station 2 (.....)		ug/m ³											
	Background site (.....)													
	Station 1 (.....)		ug/m ³											
	Station 2 (.....)		ug/m ³											

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Table A10: Annual Mean Concentrations of Nitrogen Dioxide (NO₂) in Ambient Air

Priority	Station Name (.....)	Analytical Method	Unit	Annual Mean Concentration														
				1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002		
!	Urban city (.....)																	
!	Station 1 (.....)		ug/m ³															
!	Station 2 (.....)		ug/m ³															
	Industrial City (.....)																	
	Station 1 (.....)		ug/m ³															
	Station 2 (.....)		ug/m ³															
	Background site (.....)																	
	Station 1 (.....)		ug/m ³															
	Station 2 (.....)		ug/m ³															

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Table A11: Annual Mean Concentrations of Suspended Particulate Matter (< 10 µm) (SPM₁₀) in Ambient Air

Priority	Station Name (.....)	Analytical Method	Unit	Annual Mean Concentration										
				1990	1995	1996	1997	1998	1999	2000	2001	2002		
!	Urban city (.....)													
!	Station 1 (.....)		ug/m ³											
!	Station 2 (.....)		ug/m ³											
	Industrial City (.....)													
	Station 1 (.....)		ug/m ³											
	Station 2 (.....)		ug/m ³											
	Background site (.....)													
	Station 1 (.....)		ug/m ³											
	Station 2 (.....)		ug/m ³											

