

GENERATION OF WASTE		
Consumption and Production Patterns	Waste Generation and Management	

## 1. INDICATOR

(a) **Name:** Generation of Waste.

(b) **Brief Definition:** The amount of all waste, both hazardous and non-hazardous, generated by main groups of industries or sectors of the economy, expressed per capita and per unit of value added (in US \$) by economic activity (at constant prices). The recommended categories are based on the International Standard Industrial Classification of All Economic Activities (ISIC) Rev. 4 and include:

- manufacturing;
- mining and quarrying;
- construction;
- electricity, gas, steam and air conditioning supply;
- agriculture and forestry;
- all other economic activities;
- households.

It also can be compiled for the whole economy without the breakdown by economic activity. In this case, it should be divided by Gross Domestic Product (GDP) (at constant prices).

(c) **Unit of Measurement:** kg/capita and kg/US \$.

(d) **Placement in the CSD Indicator Set:** Economic/Consumption and Production Patterns/Waste Generation and Management.

## 2. POLICY RELEVANCE

(a) **Purpose:** The main purpose is to show the trend in the generation of waste produced by different human activities. Waste generation per capita allows comparisons of countries with similar economies, while waste generated per unit of value added will show if there has been any decoupling of waste generation from economic growth. For each industry or sector selected, the two time series should be shown together to get the full benefit of the indicator.

(b) **Relevance to Sustainable/Unsustainable Development (theme/sub-theme):** Sound and efficient use of natural resources is an important part of sustainable development. Waste represents a considerable loss of resources both in the form of materials and energy. The treatment and disposal of the generated waste may cause environmental pollution and expose humans to harmful substances and bacteria, and therefore impact on human health. Generation of waste is intimately linked to the level of economic activity in a country. It reflects society's production and consumption patterns, and wealthier economies tend to produce more waste. In many developed

countries, a reduction in the volume of waste generated is an indication of a development towards less material-intensive production and consumption patterns, particularly as the economy moves from a heavy industry base to a more service base.

**(c) International Conventions and Agreements:** No international conventions or agreements exist covering the reduction of waste production. However, there is growing support in countries for the OECD's 3R's approach to tackling waste: Reduce, Reuse, and Recycle.

**(d) International Targets/Recommended Standards:** Some countries have set national targets for the reduction of waste within a specified time frame.

**(e) Linkages to Other Indicators:** This indicator is intimately linked to other socio-economic and environmental indicators especially those related to income-level and economic growth. Those would include: rate of growth of urban population, Gross Domestic Product (GDP) per capita, wastewater treatment, and waste treatment and disposal.

### 3. METHODOLOGICAL DESCRIPTION

**(a) Underlying Definitions and Concepts:** The precise definition of what constitutes waste is variable, but principally it can be considered as materials that are not prime products (i.e. products produced for the market) for which the generator has no further use for his own purpose of production, transformation or consumption, and which he discards, or intends or is required to discard. It excludes residuals directly recycled or reused on the site of generation and pollutants that are directly discharged into ambient water or air as waste water or air emission.

Waste is produced through the extraction of raw materials, the production and consumption of goods and services; through the processing of waste from these services (e.g. incineration residues); and through end-of-pipe control or treatment of emissions. Waste statistics usually group waste according to main economic/industrial activities in which they are generated, for example agriculture and forestry waste; mining and quarrying waste, construction waste; waste generated during energy production; manufacturing industries' waste and other industrial waste; household and similar waste; and sewage sludge. The importance of these waste categories depends on the economy of the country, and countries may choose to focus only on the activities or sectors which are most relevant for them, or to combine groups of industries because of data constraints.

**(b) Measurement Methods:** To measure the generation of waste, four different methods can be used: surveys, administrative or other sources, statistical estimation procedures and a combination of the above methods.

Surveys on waste statistics can be carried out in order to gather the relevant information directly from enterprises or households. Survey method collects information on waste generation using a questionnaire on waste from enterprises (they can be waste

generators or waste collectors and transport operators) or households. Since the number of waste collector and transport operators is limited, a census method can be considered. Administrative information source refers to any information which is collected and put together by the administration for purposes other than for waste statistics, but can also be used directly or with some additional effort to generate some of the information required for waste statistics, for example, data sets from environment agencies and other supervising authorities, associations and organisations in the public sector which organise or handle specific aspects of waste management. Administrative sources are primarily useful for filling in gaps but not for supplying the core data sets.

Statistical estimation procedures can be: the estimation of waste generation by waste factors to be applied to waste-related activities; the estimation of waste generation via models; the indirect determination of waste generation via waste treatment or waste collection.

To measure the generation of waste, a combination of the above methods can also be used. When using a combination of different sources, double counting and under-coverage should be avoided.

GDP and value added (at constant prices) are generally obtained from standard national accounts.

**(c) Limitations of the Indicator:** The classification of what is or is not waste is largely dependent on technological innovations achieved and applied; the borderline between waste/non-waste varies therefore by country, and even within a country. Currently there are no uniform definitions of municipal and industrial waste applied by the countries. The problems of varying definitions and classifications severely limit data comparability between countries or even between regions within countries.

Waste production can be expensive to measure at source, unless already done for other purposes, such as billing; thus, consistent and comparable statistics can be difficult to obtain.

Generation of waste is often mistakenly treated as a synonym for the amount of waste collected/treated/disposed of, which is measured by recording the weight or volume of waste removed and handled at the treatment or disposal site.

**(d) Status of the Methodology:** Not Available.

**(e) Alternative Definitions/Indicators:** Waste collection, which is easier to measure, may be a suitable proxy measure for this indicator in some countries.

In the absence of data on household waste, municipal waste - defined as waste collected by or on behalf of municipalities - can be used as a proxy. However it should be borne in mind that municipal waste includes waste from households, streets, commerce and trade, small businesses, office buildings and institutions (schools, hospitals, government buildings). It may therefore overlap with some of the industrial sectors. In some

countries a non-negligible proportion of household and similar waste is generated in areas with no municipal waste collection, and this needs to be taken into account.

#### 4. ASSESSMENT OF DATA

(a) **Data Needed to Compile the Indicator:** Total weight of waste generated by manufacturing industries, mining & quarrying, construction, energy production (excluding mining), agriculture & forestry, and household and similar waste, as well as population data, and GDP and value added by economic activity (at constant prices).

(b) **National and International Data Availability and Sources:** At the national level, data sources would include ministries responsible for the selected economic/industrial activities, ministries responsible for urban affairs and the environment, and statistical agencies. At the international level, the United Nations Statistics Division (UNSD), OECD and Eurostat collect data on waste generation from their member countries, and some good results are available for developed countries. Data for most developing countries is sparse and comparability is limited.

(c) **Data References:**

UNSD Web site (<http://unstats.un.org/unsd/environment/q2004indicators.htm>)

OECD website (<http://www.oecd.org/statisticsdata> )

Eurostat website

([http://epp.eurostat.cec.eu.int/portal/page?\\_pageid=0,1136239,0\\_45571444&\\_dad=portal&\\_schema=PORTAL](http://epp.eurostat.cec.eu.int/portal/page?_pageid=0,1136239,0_45571444&_dad=portal&_schema=PORTAL))

Economic information is available at

<http://unstats.un.org/unsd/snaama/Introduction.asp>

#### 5. AGENCIES INVOLVED IN THE DEVELOPMENT OF THE INDICATOR

(a) **Lead Agency:** The lead agency is the United Nations Statistics Division (UNSD). The contact point is the Chief, Environment and Energy Statistics Branch, UNSD. fax no. (1 212) 963 0623.

(b) **Other Contributing Organizations:** The United Nations Centre for Human Settlements (Habitat), the United Nations Environment Programme (UNEP), the World Bank, the World Health Organization (WHO), the Organisation for Economic Co-operation and Development (OECD), and Eurostat are involved in the development of waste indicators.

#### 6. REFERENCES

(a) **Readings:** UNSD/UNEP Questionnaire 2006 on Environment Statistics – Waste Section.

Eurostat: A Selection of Environmental Pressure Indicators for the EU and Acceding Countries - 2004 Edition.

Eurostat: Manual for the implementation of Regulation (EC) No 2150/2002 on Waste Statistics.

Various publications from the Settlement Infrastructure and Environment Programme, Habitat.

OECD. *OECD Environmental Data Compendium 2004*. OECD, Paris, 2004.

European Environment Agency. *Europe's Environment: the third Assessment*. 2003.

United Nations (2006a). International Standard Industrial Classification of all Economic Activities, ST/ESA/STAT/SER.M/4/Rev.4.

United Nations (2005). *National Accounts Statistics: Analysis of Main Aggregates, 2004*. ST/ESA/STAT/Ser.X/35. Sales No. E.06.XVII.8.

**(b) Internet site:**

UNSD home page: <http://unstats.un.org/unsd/environment/>