

MATERIAL INTENSITY OF THE ECONOMY		
Consumption and Production Patterns	Material Consumption	Core indicator

1. INDICATOR

- (a) **Name:** Material Intensity of the Economy.
- (b) **Brief Definition:** Ratio of Domestic Material Consumption (DMC) to Gross Domestic Product (GDP) at constant prices.
- (c) **Unit of Measurement:** Kilograms per \$1,000 of GDP.
- (d) **Placement in the CSD Indicators Set:** Consumption and Production Patterns/Material Consumption.

2. POLICY RELEVANCE

(a) **Purpose:** The indicator provides a basis for policies to increase the efficient use of raw materials in order to conserve natural resources and reduce environment degradation resulting from primary extraction, material processing, manufacturing and waste disposal.

(b) **Relevance to Sustainable/Unsustainable Development (theme/sub-theme):** Improving the efficiency with which materials are used and consequently reducing stresses on the environment are the subjects of chapter 4 of Agenda21, Changing Consumption Patterns. Primary extraction of raw materials, processing of the materials into products, and ultimate disposal of the waste material has major environmental impacts. Reducing the material intensity of production and consumption of goods and services is essential to environmental protection and resource conservation. Reductions in intensity of material use can be achieved by more efficient use of natural resources in production and consumption, by recycling used and waste material, and by shifts in consumption patterns to less material intensive goods and services. The indicator allows an analysis of consumption of natural resources, as well as trends in recovery and recycling.

Per-capita consumption of the materials could also be determined, facilitating the interpretation of trends in material intensity.

The indicator can also be used as a proxy for assessing trends in industrial pollution. In the United States, for example, it is estimated that material-intensive industries account for about 70% of total air and water pollution. Throughput-to-pollution ratios can be used for this calculation, although technological change would affect the results.

(c) **International Conventions and Agreements:** The 2002 WSSD Johannesburg Plan of Implementation has set an objective for 'delinking economic growth and environmental degradation through improving efficiency and sustainability in the use of

resources and production processes, and reducing resource degradation, pollution and waste.'

(d) International Targets/Recommended Standards: None.

(e) Linkages to Other Indicators: This indicator will of course be affected by changes in the DMC indicator. Moreover, this indicator is linked to other indicators which reflect the stage of economic development and the structure of the economy, such as share of manufacturing value-added in GDP and energy use per unit GDP.

3. METHODOLOGICAL DESCRIPTION

(a) Underlying Definitions and Concepts: A commonly agreed measurement method is described in the Eurostat methodological guide.

(b) Measurement Methods: The calculated volume of DMC is divided by GDP at constant prices to compute material consumption per unit of GDP.

(c) Limitations of the Indicator: A ratio using GDP can be misleading as growth in GDP may be driven by relatively small quantities of high-value materials, whereas material consumption is dominated by construction materials. Therefore, it might be preferable to present the 2 elements of the ratio separately, in order to facilitate the analysis of the evolution of both.

(d) Status of the Methodology: The Eurostat methodological guide is a worldwide standard reference, and is used by EU and OECD countries and the London Group (UN). There is limited use of indicators of material intensity in some developed countries, with varying methodologies.

(e) Alternative Definitions/Indicators: Alternatively, an indicator measuring 'Resource productivity' (\$/kg) can be compiled, by dividing GDP at constant prices by DMC. This is, in fact, the inverse ratio to material intensity and useful to calculate "eco-efficiency (€/impact)" an indicator which measures the environment impact.

4. ASSESSMENT OF DATA

(a) Data Needed to Compile the Indicator: DMC and GDP at constant prices.

(b) National and International Data Availability and Sources: Data is available at national level for some countries having already established MFA and on an international level at OECD and ESTAT: Eurostat has EU15 estimations on DMC/GDP and will have estimations for EU25 by end of 2007 based on a questionnaire containing commonly agreed standard tables - developed by the ESTAT Task Force and coordinated with OECD.

(c) Data References: <http://europa.eu.int/comm/eurostat>

5. AGENCIES INVOLVED IN THE DEVELOPMENT OF THE INDICATOR

(a) **Lead Agency:** The lead agency is Eurostat.

(b) **Other Contributing Organizations:** OECD (a joint Eurostat-OECD guidance manual is planned for publication in 2007. United Nations Conference on Trade and Development (UNCTAD), World Resources Institute, and the Wuppertal Institute on Climate, Environment and Energy have contributed to the development of this indicator.

6. REFERENCES

(a) **Readings:**

Eurostat. *Economy-wide material flow accounts and derived indicators – A methodological guide*, 2001

Ndiaye, D. *Statistical Study on the Consumption of Metals*. Centre d'Economie des Ressources Naturelles, Ecole Nationale Supérieure des Mines de Paris. Paris, 1991.
World Resources Institute. *World Resources 1994-95*, part IV, Chapter 21, 1995.

Behrensmeier, R. and S. Bringezu. *On the Methodology of Analysing Macro-economic Material Intensity*. Wuppertal Institute on Climate, Environment and Energy, Wuppertal Papers, No. 34, April 1995.

Hammond, Allen, et al. *Environmental Indicators: A Systematic Approach to Measuring and Reporting on Environmental Policy Performance in the Context of Sustainable Development*, (Chapter VI and Appendix I). World Resources Institute, Washington, D.C., 1995.

Hoffmann, U and D. Zivkovic. *Demand Growth for Industrial Raw Materials and its Determinants: An Analysis for the Period 1965-1988*. UNCTAD Discussion Papers, No. 50, Geneva, November 1992.

(b) **Internet site:**

<http://europa.eu.int/comm/eurostat>