INTENSITY OF ENERGY USE, TOTAL AND BY ECONOMIC ACTIVITY		
Consumption and Production Patterns	**Energy Use**	

1. INDICATOR

(a) Name: Intensity of Energy Use, total and by economic activity.

(b) Brief Definition: Ratio of total energy use to GDP: ratio of energy use by economic activity to value added.

(c) Unit of Measurement: Tonnes of oil equivalent per unit of local currency or per US $

(d) Placement in the CSD Indicator Set: Economic/Consumption and Production Patterns/ Energy Use.

2. POLICY RELEVANCE

(a) Purpose: Trends in overall energy use relative to GDP indicate the general relationship of energy consumption to economic development and provide a rough basis for projecting energy consumption and its environmental impacts with economic growth. For energy policy-making, however, energy intensities by economic activities should be used.

(b) Relevance to Sustainable/Unsustainable Development (theme/sub-theme): Energy is essential for economic and social development, but consumption of fossil fuels is the major cause of air pollution and climate change. Improving energy efficiency and decoupling economic development from energy consumption, particularly of fossil fuels, is essential to sustainable development.

(c) International Conventions and Agreements: Currently, there are no conventions or agreements that specifically refer to the regulation and/or limitation of energy use per capita. However, calls have been made for the prudent and rational utilization of natural resources (Article 174 of the Treaty Establishing the European Community — Nice, 2001), improved energy efficiency (The Energy Charter Protocol on Energy Efficiency and Related Environmental Aspects — Lisbon 1994) and a switch to cleaner forms of energy. The United Nations Framework Convention on Climate Change (UNFCCC) and its Kyoto Protocol call for limitations on total greenhouse gas (GHG) emissions, which result mainly from the combustion of fossil fuels.

(d) International Targets/Recommended Standards: Some voluntary targets at the national level have been established.

(e) Linkages to Other Indicators: This indicator is linked to indicators for total energy consumption, greenhouse gas emissions and air pollution emissions.

3. METHODOLOGICAL DESCRIPTION

(a) Underlying Definitions and Concepts: The ratio of energy use to GDP is called "energy intensity". The indicator could be called "aggregate energy intensity" or "economy-wide energy intensity". The term "energy intensity" is also used for ratios of energy use by the different economic activities to output.

The ratio of energy use to GDP indicates the total energy being used to support economic and social activity. It represents an aggregate of energy consumption resulting from a wide range of production and consumption activities. In specific economic activities, the ratio of energy use to output is the "energy intensity" (if the output is measured in monetary units) or the "specific energy requirement" (if the output is measured in physical units such as tonnes or passenger-kilometers).
The energy intensity of a process (energy consumed per unit of output) is the inverse of the "energy efficiency" of the process (output per unit energy consumed).

(b) Measurement Methods:
Energy Use: Total energy consumption is obtained from national energy balances. For the economic activities, services/commercial consumption should be carefully separated from households, and manufacturing should be separated from other industrial uses and agriculture.
Unit: tonnes of oil equivalent
Output: GDP for total energy intensity, value added for intensities by economic activity.
Unit: GDP and value added are measured in local currency for national purposes. For the purposes of international comparison, they are measured in US dollars, converted from real local currency at purchasing power parity for the base year to which local currency was deflated.

(c) Limitations of the Indicator: The ratio of aggregate energy use to GDP, often called "energy intensity" or the "energy ratio", is not an ideal indicator of energy efficiency, sustainability of energy use, or technological development, as it has been commonly used. The aggregate ratio depends as much on the structure of the economy as on the energy intensities of sectors or activities, and changes in the ratio over time are influenced almost as much by changes in the structure of the economy as by changes in sectoral energy intensities.

Interpreting the ratio of energy use to GDP in terms of environmental impact or sustainability is also complicated by differences in environmental impact among energy sources.

Given the large number of factors that affect energy consumption, the ratio of total energy consumption to GDP should not be used as an indicator of energy efficiency or sustainability in itself but in combination with other energy indicators.

(d) Status of the Methodology: The ratio of energy use to GDP, as well as sectoral and sub-sectoral energy intensities, are in widespread use, but without a standardized methodology.

(e) Alternative Definitions/Indicators:

4. ASSESSMENT OF DATA

(a) Data needed to compile the indicator:

(i) Total energy consumption and energy consumption by economic activity;
(ii) Real GDP (and/or value added by economic activity) in local currency or PPP GDP in US dollars.

(b) National and international data availability and sources: Energy balances at national level are available from most countries. The Asia Pacific Energy Research Centre (APERC), Eurostat, the International Energy Agency (IEA), the Latin American Energy Organization (OLADE) and the United Nations Statistics Division (UNSD) compile collections of regional or international energy balances from countries.

GDP and Value Added data are available from national statistical sourcesThe IMF "International Financial Statistics" provides nominal and real GDP for most countries. Data on components of GDP are often available from regional development banks or national sources.

(c) Data References:

IEA: Energy Balances of Member Countries; Energy Balances of Non-Member Countries

Eurostat: Energy balances

Latin American Energy Organization/ Organización Latinoamericana de Energía (OLADE): "Informe de Estadísticas Energéticas 2005" DE AMÉRICA LATINA Y EL CARIBE/ Energy Statistics Report

Asia Pacific Energy Research Centre (APERC): APEC Energy Demand and Supply Outlook

UNSD: National Accounts Statistics; Energy Balances and Electricity Profiles

IMF: International Financial Statistics

5. AGENCIES INVOLVED IN THE DEVELOPMENT OF THE INDICATOR

(a) Lead Agency: The lead agency is the United Nations Department of Economic and Social Affairs, Statistics Division.

(b) Other Contributing Organizations:

6. REFERENCES

Internet site: United Nations Statistics Division:
http://unstats.un.org/unsd/energy/default.htm
IAEA, UN DESA, IEA, Eurostat and EEA, 2005. *Energy Indicators for Sustainable Development*. Vienna, IAEA.