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1) General description

1.1) *Brief definition*

This indicator presents the ratio between the final energy consumption (and/or total primary energy supply) and the Gross Domestic Product (GDP) calculated for a calendar year at constant prices in purchasing power parity (PPP).

1.2) *Units of measurement*

The ratio between energy consumption/supply and GDP is expressed in kilotons of oil equivalent (ktoe) per unit of GDP in international dollars. For internal use, the GDP could supplementary be expressed in the national currency.

1.3) *Context*

Relation to other indicators from the Guidelines - This indicator relates to indicators "G-1: Final energy consumption" and "G-2: Total primary energy supply".

2) Relevance for environmental policy

2.1) *Purpose*

Energy intensity is one of the key indicators of sustainable development. Its dynamics characterize the level of efficiency of energy consumption in a country.

2.2) *Issue*

Energy is a key factor in industrial development and the provision of essential services. Traditionally, energy has been considered a key element of economic progress. However, current energy production and consumption practices have considerable negative impacts on the environment. Energy intensity indicates the general correlation between energy consumption and economic development and provides a basis for an approximate assessment of energy consumption and its environmental impact as a result of economic growth. Energy intensity depends both on the structure of the economy (high- and low-energy-consuming sectors) and on geographical factors: countries in cold climate zones, for

example, may consume 20% more energy per capita than other countries for heating purposes, whereas countries in hot climates may consume some 5% extra energy per capita for air conditioning.

2.3) International agreements and targets

a) Global level

There are no particular targets for energy intensity. The United Nations Framework Convention on Climate Change (UNFCCC) and its Kyoto Protocol call for curbing total greenhouse gas (GHG) emissions, the major share of which is CO₂ emissions caused by combustion of fossil fuels. The Kyoto Protocol establishes limits and targets for total GHG emissions for industrially developed countries and economies in transition (Annex 1 parties).

b) Regional level

The ECE Convention on Long-range Transboundary Air Pollution requires the implementation of concrete measures aimed at the reduction of emissions of pollutants into the air, including those originating in fuel combustion.

c) Subregional level

The Environment Strategy of countries of South-Eastern and Eastern Europe, Caucasus and Central Asia calls for a better integration of energy efficiency issues into environmental, economic and social policies and for the development and dissemination of alternative energy technologies in order to improve energy efficiency. In the European Union (EU), the Thematic Strategy on Air Pollution (2005) calls for using cleaner fuels and increasing energy efficiency. According to the Directive on energy end-use efficiency and energy services (2006/32/EC), each Member State should have each year saved 1% more energy than in the previous year through increased energy efficiency, which was to lead to annual energy savings of around 6% by 2012. Directive 2010/31/EU promotes the improvement of the energy performance of buildings, taking into account outdoor climatic and local conditions, as well as indoor climate requirements and cost-effectiveness on the energy performance of buildings. In 2010, Energy 2020: A Strategy for competitive, sustainable and secure energy has been adopted which requires that 20 % energy savings will be achieved at the EU level by 2020; the Strategy was followed by the Energy Efficiency Plan 2011 and Energy Roadmap 2050.

3) Methodology and guidelines

3.1) Data collection and calculations

Energy intensity of GDP in terms of final energy consumption is calculated by dividing final energy consumption (indicator “G-1: Final energy consumption”) by the country’s GDP. Energy intensity of GDP in terms of total primary energy supply is calculated by dividing total primary energy supply (indicator “G-2: Total primary energy supply”) by GDP. The GDP figures are taken at constant prices to avoid the impact of inflation and are presented with an indication of the base year (2011). GDP is measured in constant prices in international dollars in PPP, and optionally supplementary in the local currency. Data on total and final energy consumption are derived in the way described in the Guidelines for the respective indicators.

3.2) Internationally agreed methodologies and standards

The International Recommendations for Energy Statistics (IRES), adopted by the United Nations Statistics Division (UNSD) in 2011 provide data compilers with a complete set of recommendations covering all aspects of the statistical production process framework, from basic concepts, definitions and classifications to data sources, data compilation strategies, energy balances, data quality and statistical dissemination. An Energy Statistics Manual was published by the International Energy Agency (IEA) in 2005. Many other international organizations and agencies collect data on energy consumption using developed methodologies and standards: the Organization for Economic Co-operation and Development (OECD), the European Union Statistical Office (Eurostat), the European Environment Agency (EEA) and the World Bank (see references).

4) Data sources and reporting

In the countries of South-Eastern and Eastern Europe, Caucasus and Central Asia, national energy balances are prepared by the government bodies responsible for economic affairs or in state statistical offices. UNSD updates and maintains an Energy Statistics Database and a National Accounts Statistics Database. Based on these source data on total and final energy consumption can be assessed. The International Monetary Fund (IMF) International Financial Statistics Database and the World Bank’s Database of World Development Indicators provide nominal and real GDP in international dollars for most countries. IEA maintains the most comprehensive databases on energy balances, which are primarily based on national data or on data and estimates collected by regional agencies.

5) References at the international level

- United Nations Framework Convention on Climate Change: <http://unfccc.int/2860.php>;
- ECE Convention on Long-range Transboundary Air Pollution: <http://www.unece.org/env/lrtap/welcome.html>;
- International Recommendations for Energy Statistics (IRES): <http://unstats.un.org/unsd/energy/ires/default.htm>;
- United Nations, *Energy Statistics –Definitions, Units of Measure and Conversion Factors*. Series F, No. 44;
- World Bank, *World Development Indicators* (issued annually): <http://databank.worldbank.org/data/views/variableselection/selectvariables.aspx?source=world-development-indicators>;
- OECD/IEA, *Energy Statistics of OECD Countries and Energy Statistics of Non-OECD Countries* (issued annually) Part I: Methodology: http://www.oecd-ilibrary.org/energy/energy-statistics-of-non-oecd-countries_19962851-en ;
- IAEA, UNDESA, IEA, Eurostat and EEA. *Energy Indicators for Sustainable Development: Guidelines and Methodologies*. (IAEA, 2005);
- IEA Energy Statistics Manual (2005): <http://www.iea.org/publications/freepublications/publication/name,3961,en.html>;
- IEA, *Key World Energy Statistics* (2012): <http://www.iea.org/publications/freepublications/publication/name,31287,en.html>;
- OECD Factbook 2013: Energy: http://www.oecd-ilibrary.org/economics/oecd-factbook_18147364;
- EU Thematic Strategy on Air Pollution (2005): <http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=COM:2005:0446:FIN:EN:PDF>;
- Directive 2006/32/EC of the European Parliament and of the Council of 5 April 2006 on energy end-use efficiency and energy services and repealing Council Directive 93/76/EEC;
- Directive 2010/31/EU of the European Parliament and of the Council of 19 May 2010 on the energy performance of buildings;
- Energy 2020: A Strategy for competitive, sustainable and secure energy [COM(2010) 639 final];
- Energy Efficiency Plan 2011/* COM/2011/0109 final;
- Energy Roadmap 2050 /* COM/2011/0885 final;
- European Commission – Energy policy: http://europa.eu/legislation_summaries/energy/european_energy_policy/index_en.htm;
- UNSD Energy Statistics: <http://unstats.un.org/unsd/energy/default.htm> ;
- World Bank: <http://www.worldbank.org>;
- OECD I-library - Statistics: <http://www.oecd-ilibrary.org/statistics;jsessionid=1r7pxni2v4lc9.x-oecd-live-01>;
- EEA – Energy: <http://www.eea.europa.eu/themes/energy>;
- Eurostat - Energy: <http://epp.eurostat.ec.europa.eu/portal/page/portal/energy/introduction>;
- International Energy Agency: <http://www.iea.org>;
- Values of GDP in PPP in constant prices of 2005 in International dollars: <http://data.worldbank.org/indicator/NY.GDP.MKTP.PP.KD>
- International Monetary Fund – Statistics: <http://www.imf.org/external/data.htm>.