1) General description

1.1) Brief definition

This indicator presents energy resources supplied annually in a country, in total and broken down by fuel (coal, crude oil, oil products, natural gas, nuclear energy, hydropower, geothermal and solar energy, biofuels and waste, electricity, and heat).

1.2) Units of measurement

Kilotons of oil equivalent (ktoe) for total primary energy supply and supply by fuel, and percentages for shares of different types of fuel in total supply.

1.3) Context

Relation to other indicators from the Guidelines - This indicator relates to indicators „G-1: Final energy consumption", "G-3: Energy intensity" and "G-4: Renewable energy supply".

2) Relevance for environmental policy

2.1) Purpose

Total primary energy supply, in total and by fuel, is a driving forces indicator describing the development of the energy sector and the corresponding levels of energy supply.

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. These impacts are fuel-specific: for instance, the use of coal as a fuel has a major impact due to extremely high levels of pollutant emissions, whereas natural gas is one of the most environmentally compatible fossil fuels. However, production and transportation of natural gas appear to be a huge source of greenhouse gases (GHG) emissions (e.g. methane). Renewable energy sources have less negative environmental impact. Long-term objectives include continuous increases in energy efficiency that are higher than increases in energy consumption, as well as switching to consumption of environmentally appropriate

renewable energy resources. The indicator serves as a unit of measurement for power inputs in the economy. It is widely used to measure the use of various fuels.

2.3) International agreements and targets

a) Global level

The United Nations Framework Convention on Climate Change (UNFCCC) and its Kyoto Protocol call for curbing total GHG emissions, the major share of which is CO_2 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, in particular, for the development and dissemination of alternative energy technologies to increase the share of renewable energies in the energy mix, for improving energy efficiency and for greater reliance on advanced energy technologies, including cleaner fossil fuel technologies. The European Union (EU) the Thematic Strategy on Air Pollution (2005) calls for using cleaner fuels and increasing energy efficiency. The EU Directive on energy end-use efficiency and energy services (2006/32/EC) aims at boosting the cost-effective and efficient use of energy in the EU. According to this Directive, 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

Total primary energy supply is a key element of energy balances. It is calculated based on a formula taking into account the production, exports, and imports of energy, international bunkers and changes in fuel stocks. Primary production means the production of energy from coal, crude oil, oil products, natural gas, nuclear energy, hydropower, geothermal and solar energy, biofuels and waste, electricity, and heat. International trade in energy products is based on the "general trade" system, in which all goods delivered into the country or shipped out of it are registered as export or import goods. Data on changes in stocks mean data on changes in stocks with producers, importers and/or industrial consumers as of the beginning and end of the year. The values for changes of stocks can be positive or negative according to the yearly balance. Bunkers are usually related to the fuel delivered to vessels and aircrafts for international sea and air shipping, irrespective of whether or not they belong to the state. Data on exports, imports, international bunkers and changes in stocks of resources include data on both primary and secondary products (fuel products, such as petrol and lubricants produced from primary fuels). Balance calculation based on the data on total supply of fuels is carried out according to the following scheme: For each fuel type, the supply can be calculated according to the following formula:

Total primary energy supply =
(primary production + imports − exports − international bunkers + changes in stocks).

Then, using the conversion multiplier factor for each fuel type, convert the obtained volume values into common energy units. Adding up all supply values for each fuel type results in the total primary energy supply. The relative contribution of a specific fuel is measured using the ratio of energy supply originating from that fuel to the total primary energy supply calculated for a calendar year, and the result is expressed as a percentage.

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 supply 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 countries of South-Eastern and Eastern Europe, Caucasus and Central Asia, government bodies responsible for economic affairs or statistical offices prepare national energy balances. Data on fuel types and the supply of various fuels are available from national statistical agencies; some of the data are also published in national statistical yearbooks. UNSD maintains a statistical database on energy based on reports by various countries, including countries of South-Eastern and Eastern Europe, Caucasus and Central Asia. The most comprehensive database on energy balances is maintained by IEA and includes national data as well as data and estimates collected by other international bodies.

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 l-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.