

# Introduction



## ***Introduction***

The history of human evolution rests on the availability and use of energy. From the transformation from the early use of fire and animal power that improved lives, to the present world with use of electricity and cleaner sustainable fuels for a multitude of purposes - energy has been the enabler of development. Energy presents a fundamental need ranging from, but not limited to, the essential services of cooking, heating, cooling, lighting, mobility, and operation of appliances, to information and communications technology, and machines in every sector of every country. The lack of access to reliable and clean energy supplies is now considered as a major barrier to improving human well-being around the globe.

In response to increasing concerns about the effect of anthropogenic greenhouse gases on global climate, international action has agreed to reduce emissions. Renewable energy is being explored with renewed commitments as an intelligent solution to be tapped for addressing challenges such as poverty and global warming. If the world is to develop sustainably, it has been recognised that it is then necessary to secure access to affordable, reliable, sustainable, and modern energy services while reducing greenhouse gas emissions and the carbon footprint of the energy sector.

For well-balanced analysis of the energy situation of a country, it becomes imperative to compile the energy statistics for a greater understanding and course-correction to the pathway to sustainability.

However, not all energy is an object of statistical observation. Energy existing in nature and not having a direct impact on society is not measured and monitored as part of energy statistics conventionally. Energy statistics are a specialized field of statistics whose scope has been evolving over time and broadly covers (i) extraction, production, transformation, distribution, storage, trade and final consumption of energy products and (ii) the main characteristics and activities of the energy industries. Energy statistics are seen as a multipurpose body of data.

Energy resources refer to “all non-renewable energy resources of both inorganic and organic origins discovered in the earth’s crust in solid, liquid and gaseous form.” Energy reserves are part of the resources that, based on technical, economic and other relevant (e.g., environmental) considerations, could be recovered and for which extraction is justified to some extent.

The term products are understood in the same way as in economic statistics where it refers to all goods and services that are the result of production.

Energy products are a subset of products. As a general guideline, energy products refer to products exclusively or mainly used as a source of energy. They include forms of energy suitable for direct use (e.g., electricity and heat) and energy products that release energy while undergoing some chemical or other process (including combustion). By convention, energy products also include peat, biomass and waste when and only when they are used for energy purposes.

Since a number of energy products are transformed into other kinds of energy products prior to their consumption, a distinction is made between primary and secondary energy products. This distinction is necessary for various analytical purposes, including for avoiding the double-counting of energy production in cross-fuel tabulations, such as energy balances. Energy products can be obtained from both renewable (e.g., solar, biomass, etc.) and non-renewable sources (e.g., coal, crude oil, etc.).

The description of the boundary of the universe of energy products in energy statistics is not always straightforward. For example, different forms of corn/corncocks are: (1) combusted directly to produce heat; (2) used in the production of ethanol as a biofuel, (3) consumed as food, or (4) thrown away as waste.

Countries, often in the delineation of energy products, follow the International Recommendations on Energy Statistics or the IRES.

The United Nations Statistical Commission, at its forty second session (22–25 February 2011), adopted IRES as a statistical standard and encouraged its implementation in all countries. IRES provide a comprehensive methodological framework for the collection, compilation and dissemination of energy statistics in all countries irrespective of the level of development of their statistical system. In particular, IRES provides of a set of internationally agreed recommendations covering all aspects of the statistical production process, from the institutional and legal framework, basic concepts, definitions and classifications to data sources, data compilation strategies, energy balances, data quality issues and statistical dissemination.

As per the IRES 2011, recommended unit of dissemination for main categories of energy products are:

#### Recommended units for dissemination

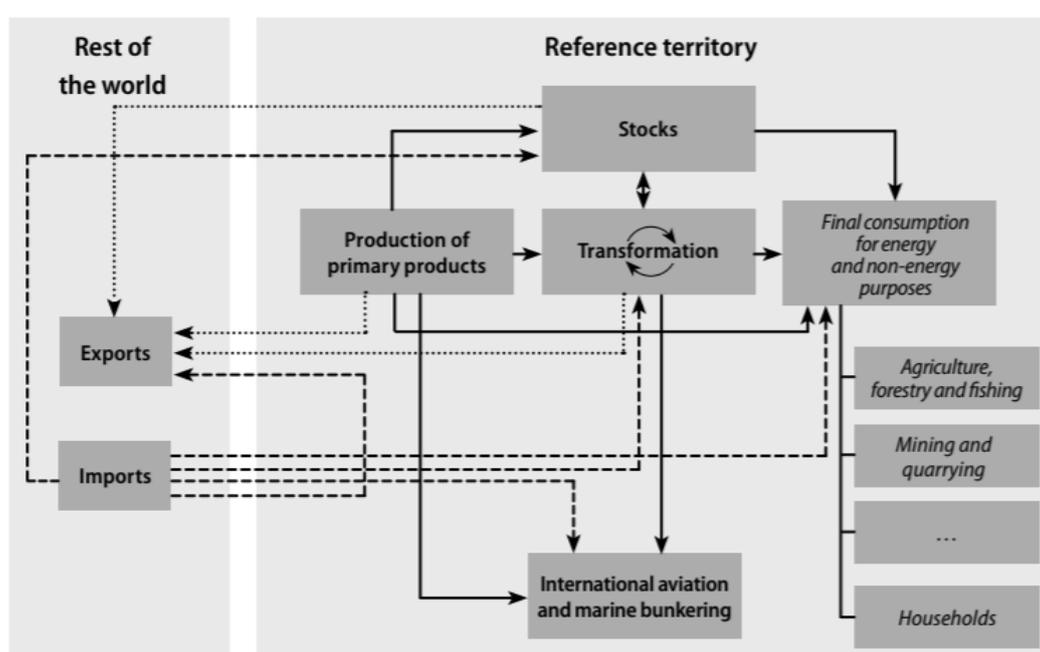
Energy products	Dimension	Unit
Solid fossil fuels	Mass	Thousand metric tons
Liquid fossil fuels	Mass	Thousand metric tons
(Liquid) Biofuels	Mass/Volume	Thousand metric tons/ Thousand cubic metres
Gases	Energy	Terajoules
Wastes	Energy	Terajoules
Fuelwood	Volume/ Energy	Thousand cubic metres/ Terajoules
Charcoal	Mass	Thousand metric tons
Electricity	Energy	GWh
Heat	Energy	Terajoules
Common unit (e.g., balances)	Energy	Terajoules
Electricity installed capacity	Power	MW
Refinery capacity	Mass/time	Thousand metric tons/year

Source: IRES, 2011, United Nations

## Energy Flows

In the context of basic energy statistics and energy balances, the term “energy flow” refers to the production, import, export, bunkering, stock changes, transformation, energy use by energy industries, losses during the transformation, and final consumption of energy products within the territory of reference for which these statistics are compiled. This territory generally corresponds to the national territory; however, it can also refer to an administrative region at the sub-national level or even to a group of countries. The term “rest of the world” is used here to denote all areas/territories outside the reference territory. The broad sectoral diagram representation of Energy Flow in an economy is presented below.

Diagram of the main energy flows



Source: IRES, 2011, United Nations

The present publication, Energy Statistics India 2023, is fully compliant with the IRES 2011 and follows the practices prescribed therein.

The publication in its various chapters presents the concepts of production, consumption, trade, energy balance etc. The data is collected from various line Ministries/Departments of Government of India including Ministry of Coal, Ministry of Petroleum and Natural Gas, Ministry of Power, Ministry of New and Renewable Energy etc. Chapter 1 presents the reserves and potential for generation in the country, Chapter 2 focuses on Installed Capacity and capacity utilization, Chapter 3 gives the production statistics of various energy resources and products, Chapter 4 adds up the statistics on imports-exports and prices in the scenario, the final availability of energy in the country is then given in Chapter 5, and Chapter 6 highlights the consumption of energy sector/industry wise. The overall energy balance combining information of all the previous chapters is presented in Chapter 7 of the publication while chapter 8 looks at sustainability in energy.

This publication, the 30<sup>th</sup> in the series, is an updated and integrated repository of statistics on energy resources and highlights the India's commitment and the progress made so far in the area of reliable, sustainable and efficient energy systems in the country.