

## Chapter-16

### ENERGY

**Background:** Development of economies has seen concomitant increase in energy use across the world, with the pace being faster in the Asian economies like China which joined the wagon later. The demand for energy has also been spurred by burgeoning population in these economies (growth in population in developed economies has slowed down) as not only more people use more energy but also due to increased per capita energy consumption, as individuals aspire for improved standards of living.

#### Terms & Definitions :

The Definitions of the terms in this chapter are as follows:

- **Hard Coal:** Coal has a high degree of coalification with a gross calorific value over 24 MJ/Kg (5700 Kcal/kg) on an ash-free but moist basis. Included are fines, middling, slurry produced in the installations at pitheads.
- **Lignite :** Brown coal is a coal with low degree of coalification. Its gross calorific value is 5,700 K.cal./kg or less on an ash-free but moist basis.
- **Coke:** The solid product obtained from carbonization of coal or lignite at high temperature.
- **Crude petroleum:** Data for crude petroleum include shale oil and field condensate but exclude natural gas liquids from plants and oils obtained from the distillation of solid fuels.
- **Liquefied petroleum gases:** include (i) hydrocarbons extracted by stripping natural gas at crude petroleum and natural gas sources; (ii) hydrocarbons extracted by stripping of imported natural gas in installations of the importing country; and (iii) hydrocarbons produced both in refineries and outside refineries in the course of processing of crude petroleum or its derivatives. Included are mainly propane, butane, isobutene and ethane.
- **Motor gasoline:** comprises of a mixture of relatively volatile hydrocarbons with or without small quantities of additives, which have been blended to form a fuel suitable for use in spark-ignition internal combustion engines. Natural gasoline, aviation gasoline and naphtha's are excluded.
- **Naphtha's:** are refined or partly refined light which are to be further blended or mixed with other materials to make high grade motor gasoline or jet fuel, or to be used as raw materials for town gas or feed stocks to make various kinds of chemical products, or to be used as various solvents, depending on the character of naphtha's derived and the demands of various industries.
- **Kerosene:** It is used as an illuminant and as a fuel in certain types of spark-ignition engines such as those used for agricultural tractors and stationary engines. The data include those products; commonly named as burning oil, vaporizing oil, power kerosene and illuminating oil. Jet fuel, white spirit and naphtha's are excluded.
- **Jet fuels:** comprise of fuel meeting of the required properties for use in jet engines and aircraft-turbine engines, mainly refined from kerosene. Gasoline-type jet fuel (light hydrocarbons, also naphtha's type, intended for use in aviation gas-turbine units as opposed to piston power units) is included.

- **Lubricants:** They are heavy liquid distillates obtained by refining crude petroleum and are used for lubricating purposes. They may be produced either from petroleum distillates or residues at refineries. Solid lubricants (e.g. grease) are excluded.
- **Petroleum coke:** is a solid residue consisting mainly of carbon, obtained by the distillation of heavier petroleum oils; used mainly in metallurgical process (excluding those solid residues obtained from carbonization of coal).
- **Bitumen (Asphalt):** is a brown to black solid or semi-solid material obtained as a residue in the distillation of crude petroleum. It is used mainly in road construction. Natural asphalt is excluded.
- **Natural Gas:** is a mixture of hydrocarbon compounds and small quantities of non hydrocarbons existing in the gaseous phase, or in solution with oil in natural
- underground reservoirs. It may be sub-classified as associated gas (that originating from fields producing both liquid and gaseous hydrocarbons), dissolved gas, or non- associated gas (that originating from fields producing only hydrocarbons in gaseous form). Included are methane (CH<sub>4</sub>) recovered from coal mines, sewage gas and natural gas liquefied for transportation. Excluded, however, are gases used for re- pressuring and reinjection, as well as gas flared, vented or otherwise wasted, and shrinkage accruing to processing for the extraction of natural gas liquids.
- **Coke Oven Gas :** It is a by-product of the carbonization process in the production of coke in coke ovens.
- **Bio Gas :** It is a by-product of the fermentation of biomass, principally animal wastes by bacteria. It consists mainly of methane gas and carbon dioxide.
- **Installed capacity:** The net capacity measured at the terminals of the stations, i.e., after deduction of the power absorbed by the auxiliary installations and the losses in the station transformers.
- **Utilities:** undertakings of which the essential purpose is the production, transmission and distribution of electric energy. These may be private companies, cooperative organisations, local or regional authorities, nationalised undertakings or governmental organisations.
- **Hydro Electricity:** as energy value of electricity is obtained by dividing the electricity generation by the average efficiency of all hydro-power stations.
- **Thermal Electricity:** comprises conventional thermal plants of all types, whether or not equipped for the combined generation of heat and electric energy. Accordingly, they include steam-operated generating plants, with condensation (with or without extraction) or with back-pressure turbines, and plants using internal combustion engines or gas turbines whether or not these are equipped for heat recovery.
- **Nuclear Electricity:** is defined as the heat released by the reactors during the accounting period and is obtained by dividing the generation of nuclear electricity by average efficiency of all nuclear power stations.
- **Production:** comprises gross production, i.e. the amount of electric energy produced, including that consumed by station auxiliaries and any losses in the transformers that are considered integral parts of the station. Included is the total production of electric energy produced by pump storage installations.
- **Imports:** refer to the amounts of electric energy transferred to the countries concerned, which are measured at the metering points on the lines crossing the frontiers. Included are imports of electric energy made by means of high voltage lines crossing frontiers as well

as imports of electric energy made by means of low-voltage lines for use in the immediate vicinity of the frontier, if the quantities so transferred are known.

- **Exports:** refer to the amounts of electric energy transferred from the countries concerned, which are measured at the metering points on the lines crossing the frontiers. Included are exports of electric energy made by means of high voltage lines crossing frontiers as well as exports of electric energy made by means of low voltage lines for use in the immediate vicinity of the frontier, if the quantities so transferred are known
- **Per-capita Energy Consumption (PEC):** PEC during a year is computed as the ratio of the estimate of total energy consumption during the year to the estimated mid-year population of that year.
- **Energy Intensity :** It is defined as the amount of energy consumed for generating one unit of Gross Domestic Product (At constant prices).

In the absence of data on consumption of non-conventional energy from various sources, particularly in rural areas in the developing countries, including India, PEC & Energy Intensity are generally computed on the basis of consumption of conventional energy.

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15	16.15	State-Wise And Source-Wise Installed Capacity Of Grid Interactive Renewable Power
16	16.16	Installation Of Off-Grid/Decentralized Renewable Energy Systems/Devices

## Sources of Data:

- Depending upon the fuels , the information relating to energy scenario( production, reserve, offtake/consumption etc) in India is provided by variety of organizations ranging from **M/o Petroleum & Natural Gas** to **O/o Coal Controller, Ministry of Mines** to **Department of Atomic Energy & Ministry of New & Renewable Energy**.
- Information on Electricity generation, transmission & distribution along with rural electrification is maintained by **Central Electricity Authority, Ministry of Power** .
- **Central Statistics Office, Ministry of Statistics & PI** brings out a publication Energy Statistics which draws information from various source agencies and provides a comprehensive report on the subject.
- Various Surveys conducted by **National Sample Survey Office , MOSPI** also provide information on the usage of energy by households for lighting , cooking etc providing an idea about penetration and expenditure besides the coverage / extent of use of different modes by households also being covered by decennial Population Census conducted by **O/o Registrar General, Ministry of Home Affairs**

## References :

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- Energy Statistics 2016, Central Statistics Office, Ministry of Statistics & PI
- Growth Of Electricity Sector In India from 1947-2015 , Central Electricity Authority, Ministry of Power.
- Emerging Opportunities & Challenges , Indian Energy Congress 2012, Price Waterhouse Coopers
- BP Statistical Review of World Energy June 2016