

Sources of Energy

Sources of Energy refer to material objects that contain energy in usable quantities. In its mutually transformable forms, energy is conventionally classified as chemical, mechanical, electric nuclear etc.

Conventional Sources of Energy: This refers to all those sources of energies which have been used traditionally to generate power. Power generated from these sources is a major source to meet power demands.

Non Conventional Sources of Energy: This refers to all those sources of energy which have been developed in the recent years and earlier were not used on a large scale to meet power demand/requirements.

Renewable Energy: The energy sources that keep on replenishing naturally provide renewable form of energy.

Non Renewable Energy: The sources that have ceased to form under the current geological & environmental conditions fall under non renewable energy sources

Example for Conventional as well as renewable energy source } Energy from water (Hydroelectric Energy)

Example for Non Conventional sources include all renewable sources including Biomass/Biogas as they keep on replenishing

Sources of Energy

Conventional

- Fossil fuels
 - Coal
 - Oil
 - Natural gas
- Atomic or Nuclear Fuels
- Energy from water (even though conventional, it's a renewable source of energy)
(water supplied by rivers, waterfalls)

Non Conventional

- Solar Energy
- Wind Energy
- Geothermal Energy
- Tidal Energy
- Wave Energy
- Ocean Thermal Energy
- Biomass/Biogas.

All Non Conventional Energy sources listed above are renewable including Biomass/Biogas as they keep on replenishing.

S.No	Energy source	India	World
1	Coal ($10^9 t$)	190	7500
2	lignite ($10^5 t$)	2.063	2000
3	Water Power (T.Wh/year)	218.4	5000
4	Oil ($10^6 t$)	140	256000
5	Natural gas ($10^9 m^3$)	63.6	15000
6	Uranium ($10^3 t$)	73	5000
7	Thorium ($10^3 t$)	500	2700

$$1 \text{ TWh} = 10^9 \text{ kWh}$$

<i>Year</i>	<i>Hydel, MW</i>	<i>Thermal, MW</i>	<i>Nuclear, MW</i>	<i>Total, MW</i>
1940	469	737	—	1206
1951	575	1261	—	1836
1960-61	1917	2736	—	4653
1970-71	6383	7909	420	14709
1978-79	13000	19550	1020	33570
1983-84	20000	31100	1900	53000
1990-91	28400	50300	8620	87320

The total installed capacity by the end of year 1996-97 has reached 86500 MW only.

Total installed capacity as on 31.03.2007 is 1,33,000 MW.

Table 1.2. World Renewable Energy Resources

<i>Resource</i>	<i>Form of delivered energy (Application)</i>	<i>Comment</i>
<p>Solar Total solar radiation absorbed by the earth and its atmosphere is 3.8×10^{24} J/yr.</p>	<p>Low temperature heat (space heating water heating and electricity)</p>	<p>Millions of solar water heaters and solar cookers are in use. Solar cells and power towers are in operation.</p>
<p>Wind The kinetic energy available in the atmosphere circulation is 7.5×10^{20} J.</p>	<p>Electricity Mechanical energy (Pumping transport)</p>	<p>Several multi-megawatt wind turbines are in operation and many more in construction. There are numbers of small wind turbines and wind pumps in use.</p>
<p>Biomass Total solar radiation absorbed by plants is 1.3×10^{21} J/yr. The world's standing biomass has an energy content of about 1.5×10^{22} J.</p>	<p>High temperature heat (cooking, smelting etc.) Bio-gas (cooking, mechanical power etc.)</p>	<p>Biomass (principally wood accounts for about 15% of the world's (commercial fuel) consumption; it provides over 80% of the energy needs of many developing countries. There are millions of biogas plants in operation, most of them are in China.</p>
	<p>Alcohol (transport)</p>	<p>Several thousand, million litres of alcohol are being produced notably in Brazil and the U.S. Production is increasing rapidly: many countries have launched liquid biofuel programmes.</p>
<p>Geothermal The heat flux from the earth's through the surface is 9.5×10^{20} J/yr.</p>	<p>Low temperature heat (bathing, space and water heating)</p>	<p>Geothermal energy supplies about 5350 MW of heat interior for use in bathing principally in Japan, but also in Hungary, Ice land and Italy. Morethan a lakh houses are supplied with heat</p>

<i>Resource</i>	<i>Form of delivered energy (Application)</i>	<i>Comment</i>
		from geothermal capacity is more wells. The installed than 2650 MW (thermal).
The total amount of heat stored in water or stream to a depth of 10 km is estimated to be 4×10^{21} J; that stored in the first 10 km of dry rock is around 10^{27} J.	Electricity	Installed capacity is more than 2500 MW but output is expected to increase more than seven fold by 2000.
Tidal Energy dissipated in connection with slowing down the rotation of the earth as a result of tidal action is around 10^{26} J/yr.	Electricity	Only one large tidal barrage is in operation (at La Rance in France) and there are small schemes in Russia and China. Total installed capacity is about 240 MW and the output around 0.5 TWh/yr. In addition China has several small tidal pumping stations. Several large tidal schemes are being planned.
Wave The amount of energy stored as kinetic energy in waves may be of the order of 10^{18} J.	Electricity	The Japanese wave energy research vessel, the Kaimei, has an installed capacity of about 1 MW. There are, in addition several hundred wave powered navigational buoys. Designs after large prototype wave energy converters are being drawn up.
Hydro The annual precipitation land amounts to about 1.1×10^{17} kg of water. Taking the average elevation of land area as 840 m, the annually accumulated potential energy would be 9×10^{20} J.	Electricity	Large hydroschemes provide about one quarter of the world's total electricity supply and more than 40% of the electricity used in developing countries. The installed capacity is more than 363 GW. The technically usable potential is estimated to be 2215 GW or 19000 TWh/yr. There are no accurate estimates of the number of capacity of small hydroplants currently in operation.