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FACULTY OF ENGINEERING AND
TECHNOLOGY

Lecture- 10

Energy Resources-Part 2



**Dr. Swati Sachdev,
Assistant Professor,
Dept. of Applied Sciences and Humanities**

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Use of alternate energy source

Hydroelectric Power

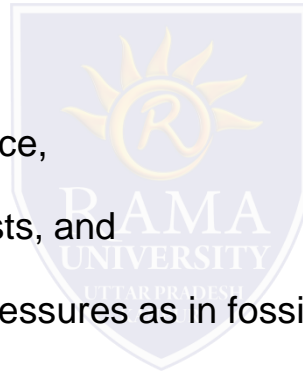
Hydroelectric plant uses water flowing under gravity to run turbines and to generate electricity known as 'hydroelectric power' by constructing dams across rivers.

Advantages of hydroelectricity:

- The long life of hydropower plants,
- the renewable nature of the energy source,
- very low operating and maintenance costs, and
- absence of inflationary (rise in prices) pressures as in fossil fuels.

Disadvantages:

- Large areas of forest and agricultural lands are submerged
- Displacement and resettlement of local tribal people
- Loss of livelihood of tribal people and farmers
- Siltation of reservoir
- Increase risk of earthquakes



Solar energy

Sun is the ultimate source of energy releasing in form of light and heat.

In one hour, the sun pours as much energy onto the earth as we use in a whole year.

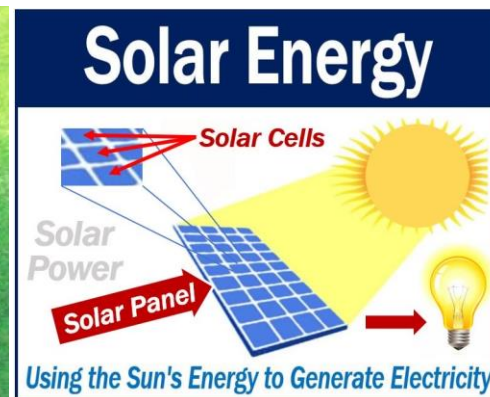
We often use solar energy to dry our clothes, preserve eatables, etc.

Several methods have been developed for collecting solar energy for heating water and generating electricity:

- Solar water heater
- Solar cooker
- Solar heat collector
- Solar cell
- Solar power plant



Solar cooker



Solar cell



Solar water heater

Wind energy

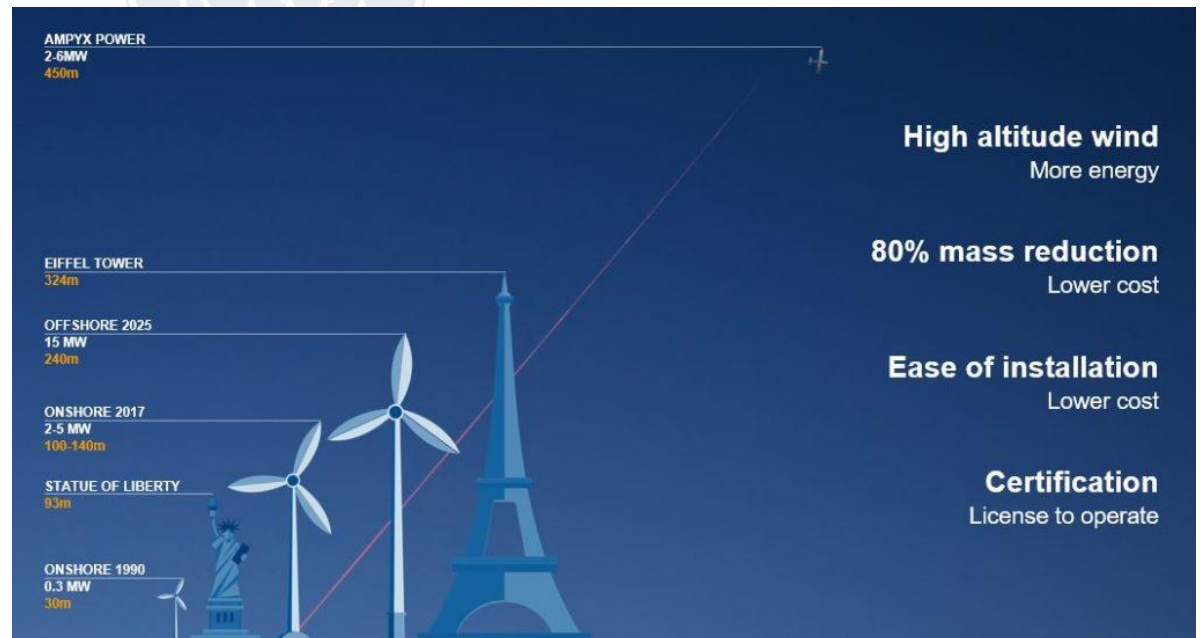
Wind was the earliest energy source used for transportation by sailing ships.

At present, India is the third largest wind energy producer in the world.

In Tamil Nadu, there are large wind farms producing 850 megawatts of electricity.

The power in wind is a function of the wind speed and therefore the average wind speed of an area is an important determinant of economically feasible power.

Wind speed increases with height.



Geothermal energy

It is the energy stored within the earth (“geo” for earth and “thermal” for heat).

The heat rising from the magma warms underground pools of water known as geothermal reservoirs.

If there is an opening, hot underground water comes to the surface and forms **hot springs**, or it may boil to form **geysers**.

With modern technology, wells are drilled deep below the surface of the earth to reach geothermal reservoirs.

The geothermal energy has been harnessed on a large scale for space heating, industrial use and electricity production, especially in Iceland, Japan and New Zealand.

Geothermal energy is nearly as cheap as hydropower.

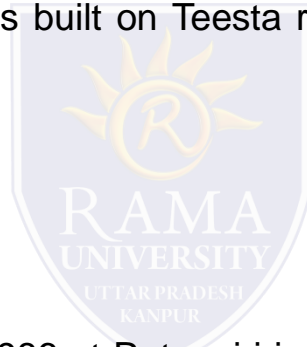
Major drawbacks: Geothermal reservoirs often contains minerals that are corrosive and polluting; and geothermal fluids are a problem which must be treated before disposal.



Case studies

Hydroelectric energy

- In India there are several hydroelectric power plant generating electricity. Koteshwar hydro-electric project, built on Bhagirathi river is one of such project with maximum capacity to generate 400MW electricity.
- Teesta stage III hydropower project: It is built on Teesta river in North Sikkim and feeds 1200 MW of power to the grid presently.



Wind energy

- In India, first wind power was set up in 1986 at Ratnagiri in Maharashtra, Okha in Gujarat, and Tuticorin in Tamil Nadu.
- At present, India is the fourth largest wind power installed country in the world.
- India has the total capacity of 7455.2 MW, Tamil Nadu is the largest producer of Wind Energy followed by Maharashtra (4450.8 MW), Gujarat (3645.4 MW), and Rajasthan (3307.2 MW).

Geothermal energy

- In India, currently geothermal energy installed capacity is experimental, with the potential capacity more than 10,000 MW.
- The six most promising geothermal energy sites in India: Puga and Chhumathang in Ladakh, Manikaran in Himachal Pradesh, Cambay Graben in Gujarat, Tattapani In Chhattisgarh and Surajkund in Jharkhand.
- The Puga geothermal powerplant currently posses 20-25MW capacity and fulfill 40% energy need of the valley.
- The Manikaran geothermal power plant has 5MW capacity.

Solar energy

- In India, 10 MW Solar energy plant has been set up at Vishakhapatnam port, Andhra Pradesh.
- The plant consists of 36,620 high efficiency solar photovoltaic modules, each of 310 watt power.
- The plant generates nearly 150 lakh units of electricity, sufficient to operate routine activities of the port. Further, any additional unit generated is sold to power utilities.

