Green Energy

Renewable sources of Energy:

Hydro power:

- Power generated from water is termed as Hydroelectricity.
- Hydro power is the energy Harnessed from running water.
- Hydro power is considered as one of the most economic and Non-polluting sources of energy.
- It contributes nearly 7% of global electricity production.
- The cost of production of hydroelectricity is relatively low, making it a competitive source of Renewable energy.
- It is also a flexible mode power generation as the quantity of production can either be increased or decreased very quickly adapting to changing demands.
- The first hydro-electric Power station in India was established at "Darjeeling" in 1897.
- National Hydroelectric Power Corporation is located in Faridabad, India.

Solar Energy:

- Rajasthan is the largest producer of solar energy in India.
- Solar Power is the conversion of sunlight into electricity, either directly using photovoltaics (PV) or indirectly using concentrated solar Power (CSP).
- Concentrated solar power systems Use lenses or mirrors and tracking system to focus a large area of sunlight into a small beam.
- Photovoltaics convert light into an electric Current using the photovoltaic effect.
- The mass objectives of the solar thermal Energy programme, being implemented by The Ministry of Non-Conventional Energy Source (MNES) are market development, Commercialisation and utilisation of heat Energy requirement of different applications in domestic, institutional and industrial Sectors.
- Solar power is used in water heaters, Refrigerators, drying, street lighting; cooking, pumping, power generator, photovoltaic cells, Salon parts etc.

Andhra Pradesh, Gujarat, Rajasthan, Maharashtra and Madhya Pradesh are the major solar power producers.

- Solar Energy Corporation of India Limited is a Government of India Enterprise.
- Its head quarter is Located at New Delhi.

Wind Energy:

- Gujarat is the largest producer of solar energy in India.
- Wind energy is extracted from air flow Using wind turbines.
- It is a cheap and pollution free source of energy.
- Powers from wind mills are used for pumping water and to sail propel ships.
- Wind power is plentiful, renewable, widely distributed, clean and produces no greenhouse gas emissions during operation.
- These plants occupy only a less space.
- The development of wind power in India Began in 1986 with first wind farms were set up in coastal areas of Gujarat (Okha), Maharashtra (Ratnagiri) and Tamil Nadu (Thoothukudi) With 55 KW Vestas wind turbines.
- The capacity has significantly increased in the last few years.
- India has the fourth largest installed wind power Capacity in the world.
- Tamil Nadu has the largest Installation of wind turbines in the country in the Aralvoimozhi area near Kanniyakumari is the largest Concentrations of wind farm capacity at a Single location in the world.

Based on the location of its Generation it is classified into

- **Onshore wind energy and**
- **Offshore wind energy**

- **Onshore wind energy**
  - Energy generated from the plants located on the land is known as onshore wind energy.
  - Onshore wind has the advantage of being one of the most affordable Renewable energy sources.

- It is cheaper than any other renewable source of energy but it requires More area to install than any other energy.

- **Offshore wind energy**
  - It refers to the use of wind farms developed in seas and oceans.
  - The Largest offshore wind farms are currently in the U.K and Germany.
  - These two countries installed 2/3 capacity.
  - London Array is the largest offshore Wind farm in the world.
  - The first offshore wind Farm is planned near Dhanuskodi in Tamil Nadu.
  - The National Institute of Wind Energy (NIWE), Chennai was established in Tamil Nadu in 1998 as an autonomous institution under the administrative Control of the Ministry of New and Renewable Energy.
  - NIWE main activities include resource Assessment testing and certification.

Biomass Energy:

- Bio energy may be obtained through bio-Degradable materials like animal dung, kitchen Wastes, water hyacinth, agricultural residues and City wastes etc.
- It is clean and cheap source of Energy.
- Energy derived from biomass is mostly used for domestic purposes.

Tidal and wave Energy:

- There are two main sources of ocean Energy. They are Ocean tides and Ocean waves.
- The Gulf of Cambay is the best suited area for Tidal energy.
- This is followed by Gulf of Kachch (1,000MW) and sunderbans (100MW).
- An wave energy power plant of 150 KW (maximum) has been installed at vizhinjam near Thiruvananthapuram.
- Another plant of this kind has been set up near Andaman& Nicobar Islands.

Geo Thermal Energy:

- Geo thermal energy is derived from the Natural heat of the earth.
- In India, exploration and study of geothermal fields started in 1970.

- The GSI (Geological Survey of India) has identified 350 geothermal energy locations in the country.
- The Most promising of these is in Puga valley of Ladakh.
- The estimated potential for geothermal Energy in India is about 10000 MW.
- **There are seven geothermal provinces in India:** the Himalayas, Sohana, West coast, Cambay, Son-Narmada-Tapti (SONATA), Godavari, and Mahanadi

Conservation of Resources:

- It takes millions of years for the formation of minerals.
- Compared to the present Rate of consumption, the Replenishment rate of minerals is very slow.
- Hence, mineral Resources are finite and non- renewable.
- Due to this, it is important to conserve the mineral Resources.

Ways of Conserving Resources:

- Controlling population growth will reduce the demand for resources.
- Creating social awareness regarding the importance of conservation of Resources.
- Reusing and recycling of resources.

Installed Generation:

- Total Fossil Fuels – 56.8%
- Total non-Fossil fuels – 43%

Overall installed Renewable Energy statistics in India:

- Rajasthan – 23431 MW
- Gujarat – 21715 MW
- Tamil Nadu – 18549 MW

Solar Power

- Rajasthan – 18089 MW
- Gujarat – 10417 MW
- Tamil Nadu – 7082 MW

Wind Power

- Gujarat – 11094 MW

- Tamil Nadu – 10300 MW
- Karnataka – 5313 MW

- **Overall Wind Energy – 44184 MW**
- **Overall Solar Power – 71780 MW**