

MCN-201 :

SUSTAINABLE ENGINEERING

Module 4

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Module 4

- ★ Resources and its utilisation: Basic concepts of Conventional and non-conventional energy

- ★ Solar energy

- ★ Fuel cells

- ★ Wind energy

- ★ Small hydro plants

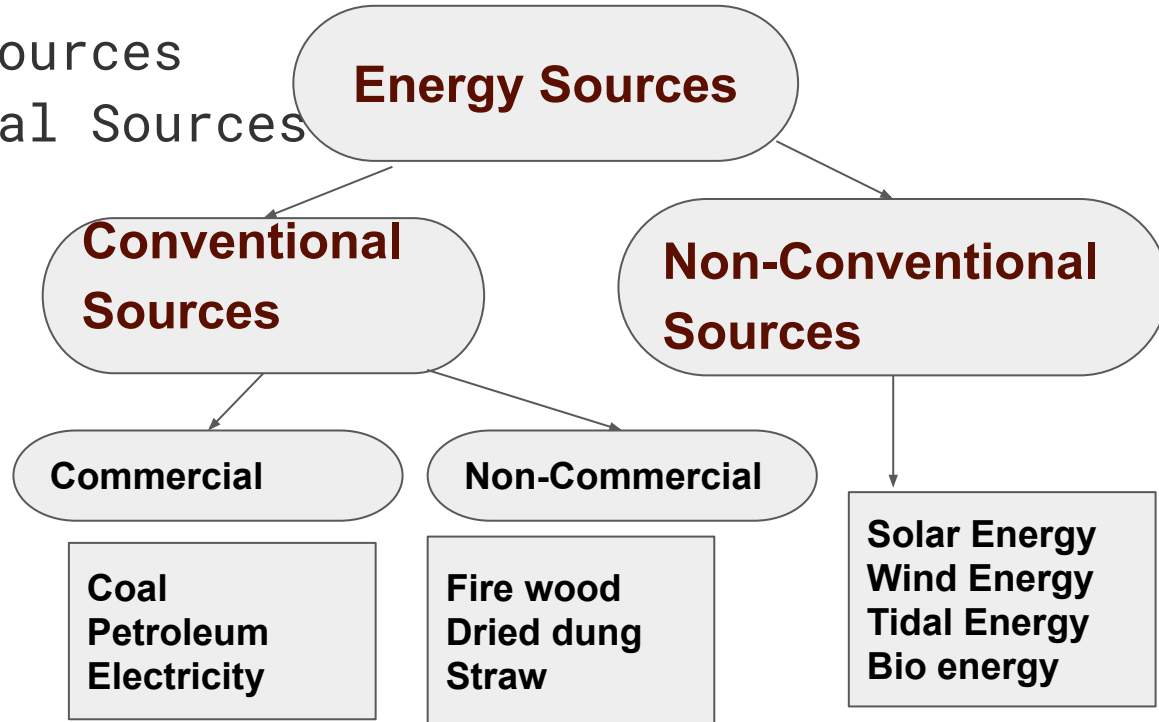
- ★ Bio-fuels

- ★ Energy derived from oceans and Geothermal energy.

1. Basic concepts of Conventional and non-conventional energy

The two major sources of energy is classified as:

- Conventional Sources
- Non-Conventional Sources



Conventional Sources of Energy

Conventional Sources of Energy are also known as non-renewable sources of energy and are available in limited quantity apart from hydroelectric power. Further, it is classified under commercial and non-commercial energy.

- **Commercial Energy Sources**

Coal, electricity and petroleum are known as commercial energy since the consumer needs to pay its price to buy them.

- **Coal:** Coal is the most important source of energy. The annual production went up to 343 million tons in India
- **Electricity:** Electricity is a common form of energy used for domestic and commercial purposes, and it is mainly utilized in electrical appliances like fridges, T.V, washing machines and air conditioning.

- **Non-commercial Energy Sources**

Generally, the freely available energy sources are considered non-commercial energy sources. Examples of non-commercial energy sources include straw, dried dung, firewood.

Non-Conventional Sources of Energy

Non-conventional sources are also known as renewable sources of energy. Examples of non-conventional sources of energy include solar energy, bioenergy, tidal energy and wind energy.

- **Solar Energy**

Solar Energy is produced by sunlight. The photovoltaic cells are exposed to sunlight based on the form of electricity that needs to be produced. The energy is utilized for cooking and distillation of water.

- **Wind Energy**

Wind energy is generated by harnessing the power of wind and mostly used in operating water pumps for irrigation purposes. India stands as the second-largest country in the generation of wind power.

- **Tidal Energy**

Tidal energy is generated by exploiting the tidal waves of the sea. This source is yet to be tapped due to the lack of cost-effective technology.

Conventional Sources of Energy	Non-conventional sources of energy
These sources of energy are also known as a non-renewable source of energy	These sources of energy are also known as a renewable source of energy
They find both commercial and industrial purposes	They are mainly used for household purposes
These can be considered to be one of the reasons for the cause of pollution	These are not responsible for the cause of pollution
Coal, fossil fuels are two examples	Wind, solar energy and Biomass two examples

2. Solar energy

- ★ Solar energy is a sustainable energy and is inherently more sustainable than fossil fuel energy sources. As a way of converting the sun's energy into electrical energy, solar panels make use of the single most sustainable resource on the planet - the light of the sun.

Solar Sustainability

- ★ Sustainability means "development that meets the needs of the present without compromising the ability of future generations to meet their own needs."
- ★ Solar energy embodies this widely accepted definition of sustainability because the sun's energy can be used indefinitely without diminishing its future availability.
- ★ Most experts agree that the sun is the most important source of renewable energy.

Renewable

- Solar energy is considered a renewable resource, as opposed to non-renewable energy sources, such as fossil fuels, which are finite.
- There is more than enough solar power to provide for all the energy needs of the planet, even if the Earth's population continues to grow and consume more energy, making it an important component of effort to combat climate change.

Non-Polluting

- Fossil fuels cause pollution as they are consumed, while solar energy does not, which is another way that it embodies the principles of sustainability.
- Solar panels sit idly on rooftops or in large solar arrays, creating no waste products, noise or any other outputs - just clean electrical energy.



Disadvantages of Solar

High Costs

A major reason why solar energy has not become more widespread is that it is not yet economically sustainable.

Non-Renewable Materials

- ★ While the sun is in an inherently sustainable energy source, some of the materials needed to make solar panels are not sustainable.
- ★ Solar panels are built with rare minerals, such as selenium, that will eventually be exhausted if solar panel manufacturers continue to extract them at an accelerating pace.

Applications of solar technologies include:-

Solar water heating:

- ★ Heat from the sun is used to heat water in glass panels on our roof.
- ★ Water is pumped through pipes in the panel.
- ★ Using the heat from the sun, water pipes get hot and heat the water without using electricity.

Solar Cars:

- ★ It is an electrical vehicle which is recharged from solar energy or sunlight.
- ★ Solar panels are used on this car that absorb light and then convert it into electrical energy.
- ★ This electrical energy is stored in batteries used within the car, so that we can drive these vehicles in night time too.