

Q Differentiate b/w Renewable and non-renewable sources of energy? Briefly explain wind energy, solar energy, biofuels, Geothermal and Hydroelectricity? (combined 2 q's)

Renewable sources of energy:

Renewable sources of energy are those which can be replenished e.g. wind energy, solar energy, biofuels etc.

Non-Renewable sources of energy:

Non-renewable sources of energy are those which cannot be replenished after their utilization e.g. coal, gas, fossil fuels etc.

| | Renewable | Non-renewable |
|------------------|--|--|
| Depletion | Renewable sources of energy are not depleted, they are replaced as they are naturally occurring. | Non-renewable sources of energy are depleted after a certain time. |
| Cost | Very high cost is required to install. | Less cost is required. |

| | Renewable | Non-renewable |
|----------------------------|--|---|
| Sources | Wind, solar heat, Biofuels etc. | Coal, gas, Petroleum |
| Impact on Environment | They are safe for environment as no emissions or less emissions. | Very high quantities of gases are emitted which are not safe. |
| Infrastructure requirement | High cost is required for infrastructure which is not accessible to every ^{one} . | Less infrastructure is required which is cost-effective and accessible. |
| Area requirement | Large areas are required for planting wind and solar energy plants. | Not that large area is required. |

i) Wind Energy:-

Wind energy is a type of renewable source of energy which converts the kinetic energy of wind into electrical energy through wind turbines. Its advantages are that it is ^{environment} cost effective and disadvantage is it is costly.

In Pakistan, it is preplanned in Sindh, named as Jamshoro.

wind power plant.

1. Solar energy-

Solar energy is that in which thermal or electrical energy is generated from the sun's heat through solar photovoltaic cells or solar thermal panels. Its advantages are that it is renewable and clean energy, while disadvantages are costly and weather effects.

Biofuels-

Biofuels is that in which energy is generated from biological materials i.e. plants, animal wastes and algae. It is considered to be renewable source being cost-effective and less harmful to the environment. But, less energy can be harnessed from biofuels.

Ex: Vegetable oil, Biodiesel, Bioalcohol, Bioethanol.

Geothermal energy:

It is the type of energy in which hot water in the Earth's crust provides the heat for generation of electricity or energy. High temperature in the Earth's crust melt the rocks called magma. This magma converts the hot water into steam which provides the thermal energy.

Its advantages are renewable sources of energy while disadvantages are costly, gases can be emitted, transmission and transportation is very difficult.

Hydroelectricity:

Hydroelectricity is that in which natural flow of water is used to produce electricity. As water is more denser than air, so energy contained in water while flowing even at low speed can be used.

to produce electricity. It is the first ever method to try of renewable energy source. Almost 37% of energy production in US is from Hydropower.

Q: What are the advantages and limitations of renewable energy resources? Briefly explain the prospects of non-conventional energy resources in Pak.

Renewable energy resources are those which can be replenished or cannot run out even after the utilization.

The examples are wind energy, solar energy, biofuels, hydropower etc.

Advantages of renewable resources:-

i) Renewable resources are non-replenishable:-

Renewable resources of energy are replenishable i.e.

they are replaced and don't
depleted, can be used for
lifetime almost.

ii) Provides clean energy:

Renewable sources of energy
provides clean energy, as no
gases are emitted during energy
production. So, this type of
energy generation is environment
friendly.

iii) Better economic impact:

As the burden of oil
imports will decrease with more
reliance on renewable sources of
energy, as it is naturally occurring.
So, economic conditions of
country may get better.

Limitations

**i) High cost and infrastructure
is required:**

The process of energy generation
is costly as modern infrastructure
is required to produce energy

through renewable sources of energy.

ii) **Weather conditions may affect the energy generation:**

As, the energy generation is dependent on natural resources i.e. wind, sunlight, water etc. Weather changes may affect the energy generation so backup plan is needed.

iii) **Difficult for poor countries to shift on renewable source:**

It is difficult for the poor economic countries to follow this type of energy generation as it required a large and modern infrastructure and large amount is required for plantation.

Prospects of non-conventional energy in Pakistan

Non-conventional energy sources are those which are not regularly in use but are useful - e.g. wind, solar, hydropower etc. As, Pakistan is blessed with best sources.

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High wind blowing in areas in Sindh and Balochistan where wind energy can be generated. While, Pakistan experiences long summer, having long sunny days. So, solar energy can be generated. Tapping these resources is a crucial step to attain the clean environment and to reduce the economic burden of oil import. With so many sunny days a year, covering 100km of land with photovoltaic panels would generate electricity equals to 30 million tons of oil.