8. Energy management

Let us Assess

1. Question

Classify the following sources of energy as renewable and nonrenewable. Which among them are sources of green energy? Write them down

•Petroleum •coal • wind

• ocean • wave • hydroelectric power

• solar energy.

Answer

1. Renewable => Renewable sources of energy are

Those that can be replenished. Therefore Wind; Ocean; Wave; Solar; Hydroelectric power are renewable sources of energy because they can be reproduced and they do not cause pollution.

2. Non - renewable=> Non-Renewable sources of energy are

Those that cannot be reproduced. Therefore Petroleum; Coal are non-renewable sources of energy. Also they cause environmental pollution.

3. Green Energy sources => All the energy produced from the renewable sources of energy belongs to green energy. Therefore Solar; Wind; Wave; Ocean; Hydroelectric power are green energy. Also they do not cause pollution.

2 A. Question

Explain.

Hydrogen is not used as a household fuel though it is of very high calorific value.

Answer

Hydrogen is not used as a household fuel though it is of very high calorific value due to following reasons.

1. It is costly and is not easily available.

2. Storage of hydrogen is very difficult.

3. It is highly explosive due to which it may cause severe damage.

4. It does not burn at slow rate with the controlled combustion.

5. It is not safe to handle.

2 B. Question

Explain.

Fossil fuels are to be used judiciously

Answer

Fossil fuels should be used judiciously because they are exhaustible and are present in limited amount in nature. Also the formation of fossil fuels takes millions of years. When the fossil fuels are burnt it causes pollution. The fossil fuels are not present evenly on the earth. Hence the availability of fossil fuels is also less. Therefore, they should be used judiciously.

2 C. Question

Explain.

As far as possible avoid burning of biomass

Answer

The fuel obtained from plants and animals is known as bio waste or biomass. We should avoid burning of

biomass due to following reasons.

1. Burning of the biomass produces smoke which contains carbon dioxide and other harmful gases due to which environment is pollutes.

2. Also burning of biomass produces greenhouse gases which are cause of global warming.

3. The ash left out after burning may mix with the air w inhale and we may get diseases like asthma etc.

3. Question

Establish that encouraging the use of green energy is a need of the time.

Answer

Green energy is produced from the renewable sources like Wind, Ocean, Solar energy etc; hence the energy is available in abundance. Also, the green energy does not cause environmental pollution; hence it is eco-friendly. Since the green energy can be reproduced hence there are no chances of scarcity of it. Therefore, we should use the green energy.

Extended Activities

1. Question

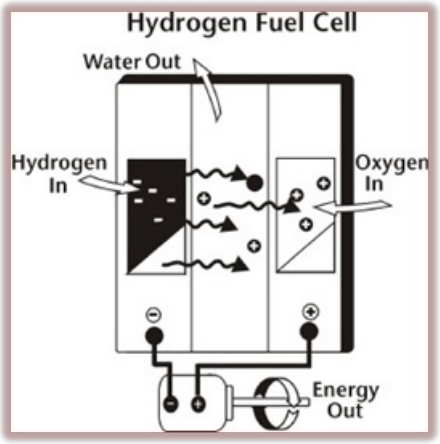
Find out the scope of hydrogen as a fuel with a high calorific value and prepare an essay

Answer

Introduction => Hydrogen is a clean energy similar to electricity having high calorific value of 150000 kJ/kg. Hydrogen can be produced from various resources such as renewable energy and nuclear energy. In the long-term, hydrogen will simultaneously reduce the dependence on non-renewable resources like coal, petroleum etc which causes environmental pollution and emission of greenhouse gases and other pollutants.

Hydrogen as an Energy Carrier => Hydrogen as an important energy carrier in the future has a number of advantages. For example, it has a high efficiency, low polluting hence can be used for transportation, heating, and power generation in places where it is difficult to use other sources of energy. It is cheaper to transport hydrogen through pipelines.

Uses =>currently, hydrogen is mainly used as a fuel in the NASA space program. Liquid hydrogen is used to propel space shuttle and other rockets, while hydrogen fuel cells power the electrical systems of the shuttle. The hydrogen fuel cell is also used to produce pure water for the shuttle crew.



The Future use of Hydrogen => In the future, hydrogen will be an important energy carrier, since it can be made safely from renewable energy sources and is virtually non-polluting. It will also be used as a fuel for ‘zero-emissions’ vehicles, to heat homes and offices, to produce electricity, and to fuel aircraft.

2. Question

Visit a hydroelectric power station and try to understand different stages of the production of electricity. Make use of this principle and find out the scope of mini hydroelectric power project.

Answer

In a hydroelectric power plant, water is turned into electricity, which is carried to consumers along a transportation and distribution network.

The steps involve in production of electricity are as follows:

1. The dam raises the water level to create a vertical drop along the length.

2. The water takes on energy as it flows down and is carried with force to the turbine.

3. The generator converts water power into electricity. Figure below shows the generator unit.

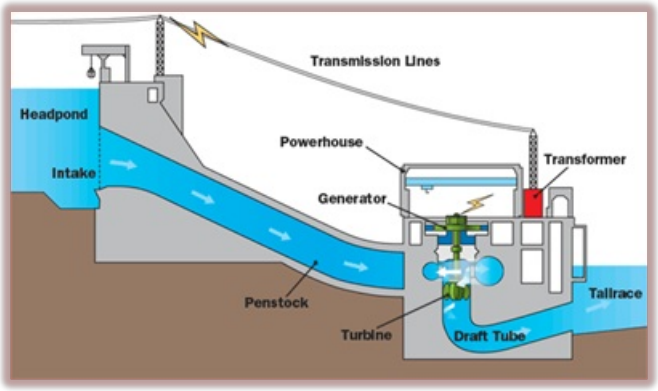
4. The generator produces electricity through the movement of the rotor in the stator.

5. The electricity produced is integrated into the network.

6. At the outlet end of the power plant, the transformer increases the voltage; this reduces energy losses during transmission over long distances.

7. Electric power produced by the generator is transmitted to a transformer at the power plant outlet.

Figure Below shows the hydroelectric power station.



3. Question

Visit a biogas plant and explore the possibility of establishing a community biogas plant in your region.

Answer

Biogas Plant => Biogas is a gas produced by the breakdown of organic matter Biogas is a renewable and flexible source of energy. The biogas plant converts the biogas produced by organic matter into energy, which can be used for cooking, heating, the production of electricity, as a transport fuel.

The working of biogas plant is as follows:

1. Organic input materials such as foodstuff remnants, fats or sludge, manure and dung is fed into the biogas plant as substrate.

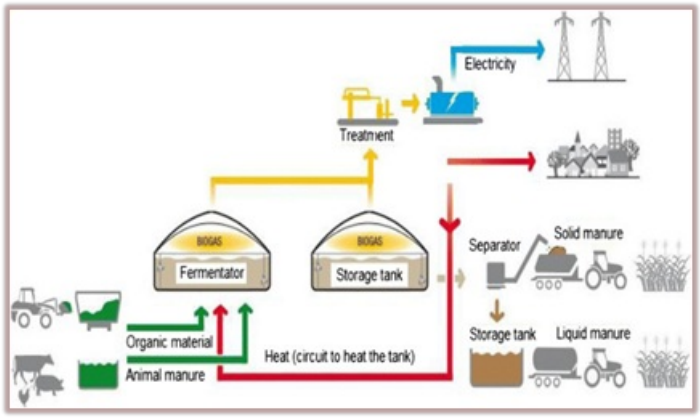
2. The fermenter is heated to approx. 38-40 °C, the substrate is decomposed by the microorganisms under presence of light and oxygen. The final product of this fermentation process is biogas.

3. The biogas generated is stored in the roof of the tank and from there it is burned in the combined heat and power plant (CHP) to generate electricity and heat.

4. The electric power is fed directly into the power grid.

5. The heat generated can be utilized to heat building or to dry wood or harvest products.

The figure below shows the biogas plant.



Scope for Plant in My Area =>There is wide scope of establishment of biogas plant in my area because the ingredients required for the production of the biogas are available easily in my area.

4. Question

Write a short play to make the public aware of the need for making use of solar energy.

Answer

Solar energy is the energy that is produced by the sun in the form of heat and light. It is one of the most renewable and readily available sources of energy on planet Earth.

Owing to the severe scorching heat most households are using air-conditioners through the day and night. Coupled with the other daily usages, the monthly bill is hitting the roofs.

Due to which I strongly feel that people should switch over to solar energy as an alternative immediately. It is a renewable source of energy, environment friendly and a great way to reduce the bills.

The establishment of the solar panels and the solar cells requires less maintenance and also it is easy to install on the rooftop of the houses as shown in the figure below.

5. Question

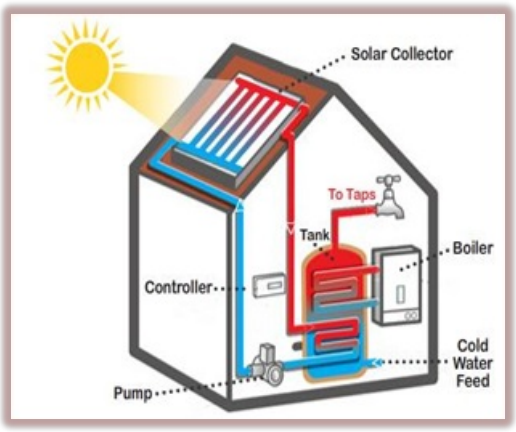
Solar energy has an incredible future in the field of transportation. We are in its infant stage. Write an essay on the topic “Prospects of solar energy”.

Answer

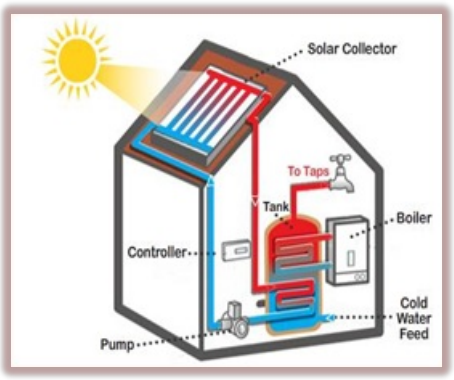
Introduction => Solar energy is one of the fastest growing sources of energy in terms of electricity generation. Solar energy is produced from the sun rays received from the sun.

There are two ways in which sun's ray are used to generate power:

1. Solar thermal - Solar thermal energy is a technology for harnessing solar energy for thermal energy (heat).image below shows it.



2. Solar Power Tower - Solar power towers are huge towers erected in the middle of large reflective mirrors (called heliostats) which concentrate the solar radiation to this tower. The heat is then transferred to generate steam and produce electricity. The image below shows the solar power tower.



Global Scenario => Going by the current growth rates of the solar power source, it is being predicted that energy generated from these sources would be the biggest power source for the world in a few decades. European nations are ahead from the rest of the world in terms of the usage and production of the solar energy.

Solar Power in India => With increasing pressure from the developed country to lower the pollution levels, it has become imperative for India to look for non-polluting sources of energy like solar energy. Solar energy could emerge as one of the best options for clean energy. Many schemes are run by government to support the generation of solar power.

High Cost =>Compared to electricity from coal-fired power plants, solar is more expensive. Despite the fact that the price of Solar Photovoltaic technology has been coming down over the years it still remains economically unviable for power generation purposes. The average cost of Solar PV modules was around Rs. 2 lakhs per kW.

6. Question

Find out the advantages and disadvantages of main energy sources and tabulate them.

Answer

Serial Number	Source of Energy	Advantages	Disadvantages
1.	Solar	Renewable source; do not causes pollution; easily available.	The device used to convert sun rays into energy like solar panels are costly; Not effective in cold countries where sun rises for less time.
2.	Wind Energy	Nonpolluting; Renewable source; Available in abundant amount.	The windmills which generate energy can be used only on high altitude where speed of wind is high; Cannot be used in region where wind blows slowly.
3.	Coal	Cheap; Easy to use; produces sufficient amount of energy.	Nonrenewable; Causes environmental pollution; available in limited amount on earth hence may exhaust one day.
4.	Nuclear Power	Produces huge amount of energy with less uranium; Huge amount of electricity can be produced.	The nuclear reactors are very costly; there are chances of nuclear disaster; Nonrenewable; waste of nuclear reactor causes pollution.
5.	Hydroelectricity	Nonrenewable; Do not causes environmental pollution; Water which is used is available in abundance	Building of dams and setting up of hydroelectric power plant is costly; Due to dams there are chances of floods in areas near dams.
6.	Hydrogen	Have high calorific value; Can be transported easily through pipelines;	Costly; highly explosive; do not burn at slow rate; not safe to handle.

7. Question

A nuclear reactor is about to be established in Kerala. What is your reaction to this proposal? Justify.

Answer

Nuclear reactor is one of the best sources of energy. The huge amount of energy can be produced which can be further used to generate the electricity. But there are certain problems associated with the establishment of nuclear reactor. According to me they are as follows:

1. The coolant water and low-grade waste from the reactor is going to be dumped in to the sea which will have a severe impact on fish production and will cause water pollution. It may affect the food security of the entire southern Tamil Nadu and southern Kerala.

2. Large number of people needs to be displaced in order to set up the nuclear reactor.

3. If in case the nuclear disaster happens then the effect of radiations will be in a very large area, and it may cause many diseases and disabilities.

4. I will be very difficult to evacuate the areas near the reactor during nuclear disaster, thus many lives will be lost due to radiation.

8. Question

A man pointing at a car running on petrol says, “This car is running on solar energy” Write down your responses about this matter.

Answer

Since the car is running on petrol but the man pointing to it says that it is running on solar energy, The man is telling wrong because the car running on petroleum cannot run on solar energy. Also the petroleum is non-renewable source of energy whereas the solar energy is renewable. Till now petroleum is extracted from sea and oil fields without the use of solar energy. Therefore the man is wrong. But in future if we start to extract petroleum by using solar energy than the man may be right.