14. Sources of energy.

Notes

Class 10

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Hello guys are you excited to study the thing which is the most essential part of all of our routine activities? Yes we are going to learn about Energy and its sources. As we have learnt in std. 9^{th} that 'Energy is capacity of doing work'. We need energy for performing all tasks. E.g. For cycling we use muscular energy store in body, to cook food we use heat energy

In modern era, we use different forms of energies obtain from sources like petrol, diesel, LPG gas, Electric energy, thermo electric power station and so on.

Energy always carried from higher end to lower end.

Depending upon the applications, good sources of energy should be

1. Able to do maximum work per unit mass.
2. Readily available for application.
3. Convenient to store and transform all over geographical locations.
4. The most important that, it should be available at low cost.

Sources of energy are basically categorised as

1.) Conventional sources, 2.) Non - conventional sources.

Conventional sources of energy:

The sources of energy that is available in nature are known as conventional sources.

Eg.fossil fuels, crude oil, gas or coal etc.

Let's discuss some in detail

1.) Fossil fuel:

We know that human being have started using wood to produce heat energy, which the most common type of fuel available in current times too! Coal is used for running engines of train, petroleum fuels are at stake of usage. These all sources are nothing but fossil fuels. They are mainly formed in nature due to forest fires; decomposition of animal waste and dead bodies leads formation of coal and some natural processes.

These sources are present in limited extent, so after certain year it will run out of stock. Human being depends largely on fossil fuels for his routines, along with this Industrialization, deforestazation are some main reason that would lead us to the end point of these sources.

Some important drawbacks/limitations of fossil fuels:

1. It produces the hazardous gases like carbon dioxide during burning which increase the air pollution in atmosphere.
2. Release of gases like SO_2 can cause acidic rainfall, produces green house gases which are responsible for global warming.
3. As they are non-renewable sources, has limited resources.
4. Need to find alternative for fossil fuels as soon as possible.

There should be alternative for fossil fuel. In this technological world, electric energy is most suitable and convenient source of energy is present with us. You have already learnt the working of electric generator, which works on principle of electromagnetic induction but need to rotate the armature coil mechanically, for this purpose some method are available as follows.

1. **Thermal Power Plant:**

Burning of fuel i.e. heat energy is converted in to electric energy is known as thermal power project.

Steam is produced when fossil fuels are burnt, this steam which has capability to rotate the turbines of electricity generator. This method of production of electric energy is known as thermal power plant. As we know that, transmission of electric energy is more convenient than any other forms, hence it is more reliable source of energy.

2. **Hydro Power Plant:**

The kinetic energy of flowing water is used to rotate the turbines which produce electric energy; such plants are known as hydro power plant.

Dams are constructed in river so that water is stored at higher potential energy. This potential energy of water is converted in to kinetic energy when it is allowed to flow through windows of dams. This flow of water has high pressure, hence when it falls on turbines of generator, it starts rotating and electric energy is produced. In India some major hydro power plants are,

1. Tehri Hydropower project, Tehri Dam in Uttarakhand, which is highest hydro power project in the India, produces electric energy of capacity 2,400MW.
2. Koyna Hydroelectric Project, Koyna Dam Maharashtra, of 1,960MW capacity.

Improvements in the Technology for using Conventional Sources of Energy:

Modern techniques has helped us a lot to reduce usage of fossil fuel, recycle the wastes from animals, plants. This is a kind of revolution is takes place which is going to become a biggest landmark in the generation of alternating forms of energy. Let's learn more about them in following articles.

Bio-Mass:

The fuel which can be generated from plant and animal products (waste) is known as Bio-Mass. Eg. Cow-dung cake. Use of such fuel can fulfil need of fuel for the country. As like fossil fuel they aren't that efficient because it produces less heat when burns and

gives out large smoke, sot should be used technologically so that it can give us good output and efficiency.

It mainly consists ofcow-dung, waste of animals, plant materials which left behind in harvesting the crops, vegetable waste allowed todecompose in the absence of oxygen to produce bio-gas. This Bio-gas can be used as fuel for cooking instead of LPG. It mainly contains cow-dung,thusknown as 'gobar-gas'. It contains about 75% of methane which is combustible gas. Refer the figure showing small Gobar-gas plant.

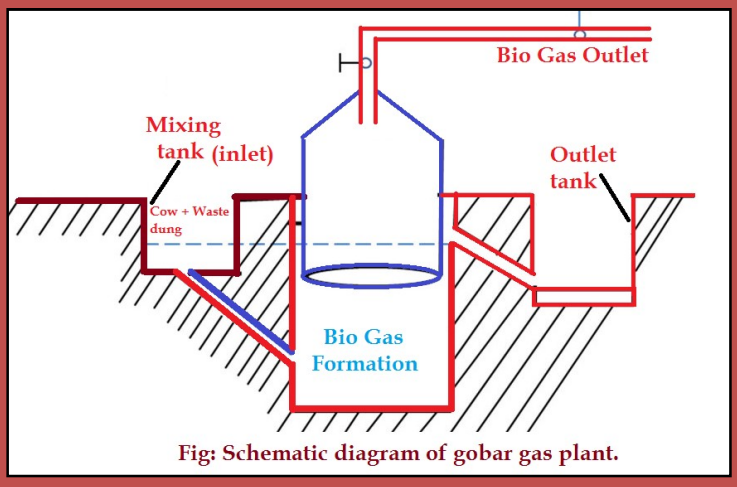

Fig: Schematic diagram of gobar gas plant.

Slurry of cow dung and other waste is added in mixing tank. This slurry is then sent to digester tank where slurry is allowed to get decompose for 10/15 days and then produces gases like methane, hydrogen sulphide and CO_2. The bio gas is stored in a tank mounted above digester tank and can be used via outlet provided with tap.

Slurry left behind contains nitrogen and phosphorus is used as fertilizers. The bio-gas is 100 % safe and cost free mode of fuel.

Wind mill:

It is non conventional energy source, which is used is larger scale for production of electric energy in recent time. It uses kinetic energy of air to rotate the blades of windmill, then this mechanical energy is converted into electric energy using principle of electromagnetic induction.

A windmill mainlyconsists of,

1. Tower of height ranges from 50 m to 200 m.(base of wind mill)

2.Rotor blades with generator.

Windmills are quite expensive and do not produce electricity in large scale, hence farm of windmills is constructed and electric energy produced by each tower is collected so as to use for commercial purpose. Germany is top at the names of countries which produces electric energy from windmill, whereas India ranks 5^{th} in the list.

Non conventional energy sources:

According to current scenario, conventional sources of energy will evacuate very soon, so human being has to think for non-conventional or renewable sources of energy.

The advantages of these sources are that, they are pollution free and available at free of cost in nature, we just need to establish the proper setup to utilise it.

Solar energy:

Sun radiates its tremendous energy in the form of heat and light. It is said that sun will continue to radiate this energy for at least 5 million more years with the same intensity.

We can utilise this energy by constructing set up of solar panel, which uses semiconductor material to convert the light energy in to electric energy. These materials are known as solar cell. Apart from its installation cost, it almost free form of energy. In small scale one can use this solar energy by converting into heat energy using setups like solar heater, solar cooker etc. The only drawback of this energy is that it is not available throughout all seasons for 24 hrs. Refer following figure showing solar cooker and solar panel fitted on roof of building.

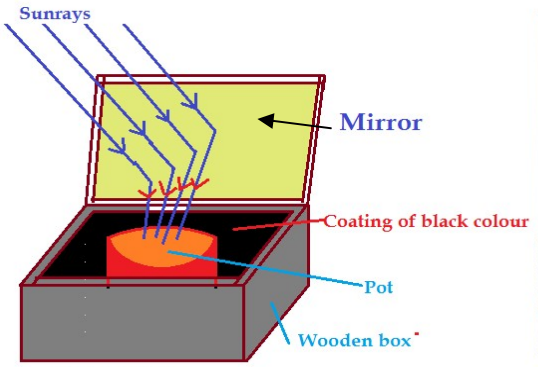

Fig:Solar cooker


Fig:Solar panel fixed on roof of building

Tidal Energy:

Gravitational force of attraction between Earth and Moon forms high tides and low tides, which creates the difference in sea level at that point. This difference in sea level can utilise as tidal energy. It can be used by constructing dams at orifice (narrow opening of sea water where it flows with high speed) of sea, so that the kinetic energy of sea water can be converted in to electric energy using turbines.

Wave Energy:

Strong with flow with higher speed and pressure difference creates the huge and high speed seashores are the source of wave energy. Kinetic energy of seashore can be utilising to generate electric energy with the help of turbines. This form of energy generation can be applicable where the speed of seashore (i.e. wave energy) is high.

Ocean Thermal Energy:

Continuous radiation of sunlight on surface of ocean, difference in temperature is maintained between upper layer of ocean and water in deeper part of ocean. This difference in temperature temperature of ocean surface is termed as Ocean thermal energy. Ocean thermal plant can operate when the temperature difference is around 20^0C and up to 2 km depth of ocean. Hot water surface is used to vaporise liquid