

NON- CONVENTIONAL ENERGY SYSTEM

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Abstract:- Literature reviewed on non-conventional energy sources. Development of non-conventional energy. Its present scenario in India & their applications

I. INTRODUCTION

- **Energy:** □ Energy broadly means the capacity of something, a person, an animal or a physical system to do work and produce change. □ Used in science to describe how much potential a physical system has to change. Sources of Energy. Conventional sources of energy Non conventional sources of energy.
- India ranked sixth in the world in total energy consumption. India has installed power capacity from 1262 megawatt to over 112.058 megawatt . This achievement is impressive but not sufficient . So we mostly needed the renewable source of energy.
- **3. Non- Conventional Energy** sources: □ Those energy sources which are renewable and ecologically safe. such as solar energy, wind energy, biomass energy, ocean energy (tidal energy, wave energy, ocean thermal energy), geothermal energy, nuclear energy etc. □ Some sources of energy are non renewable like coal, petroleum and natural gas.
- About 16% of global final energy consumption comes from renewable, with 10% coming from traditional biomass, which is mainly used for heating, and 3.4% from hydroelectricity. □ New renewable (small hydro, modern biomass, wind, solar, geothermal, and biofuels) accounted for another 3% and are growing very rapidly. The share of renewable in electricity generation is around 19%, with 16% of global electricity coming from hydroelectricity and 3% from new renewable.
- (i) The growing consumption of energy has resulted in the country becoming increasingly dependent on fossil fuels such as coal, oil and gas.
- (ii) Rising prices of oil and gas and their potential shortages have raised uncertainties about the security of energy supply in future, which has serious repercussions on the growth of the national economy.
- (iii) Increasing use of fossil fuels also causes serious environmental problems.
- Hence, there is a primary need to use renewable energy sources like solar, wind, tidal, biomass and energy from waste material. They are called non-conventional sources of energy.

Various forms of non- conventional sources of energy

Solar energy
Wind energy
Biogas
Geothermal energy
Nuclear power

Solarenergy:

The sun has produced energy for billions of years. Solar energy is the sun's rays (solar radiation) that reach the Earth. This energy can be converted into other forms of energy such as heat and electricity. "Solar" is the Latin word for "sun". Photovoltaic energy can convert sunlight directly into electricity. Solar cells are joined in solar panels to generate power for heating. Solar energy is also used in solar heaters, solar cookers, solar driers and is used for community lighting and traffic signals. It is becoming popular in rural and remote areas. The largest solar plant in India is located near Bhuj in Gujarat where solar energy is used to sterilise milk cans. energy obtained from the sun in the form of heat and light. □ Energy derived in the form of solar radiation. □ The solar energy received by the near earth space is approximately 1.4 kilojoules/second known as solar constant .The heat energy is used in solar heating devices like

solar cooker, solar water heater, solar furnaces etc.
The light energy is used in solar cells.

10. Various technologies in which solar energy can be used:- Solar cookers ,Solar hot water systems ,Solar dryers ,Solar air heaters □ Solar desalination systems ,Solar batteries.

Solar cooker ∴ The box type solar cooker has an insulated box painted black inside. It is covered by a glass plate which allows heat to enter inside but does not allow heat to escape out. It has a mirror to reflect more sunlight into the box. The food to be cooked is kept in containers inside the box □ It can produce a temperature of 100° to 140°.



Solar water heater :A solar water heater has an insulated box painted black inside with a system of copper tubes. □ It is covered with a glass plate which allows heat to enter inside but does not allow heat to escape out. □ When water flows through the copper tube it absorbs heat and becomes hot.



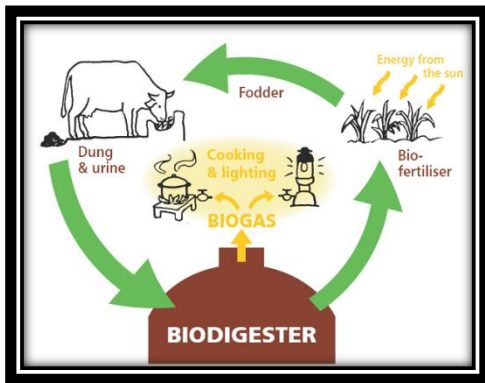
Solar cell :Device which converts solar energy into electrical energy. □ Solar cells are made from semi conductors like silicon, germanium, gallium etc. □ A single solar cell produces a voltage of about 0.5 to 1 V and produces about 0.7 W electricity. □ several solar cells are arranged in a solar panel to produce more electricity.



Wind Energy: Wind Energy Wind is caused by huge convection currents in the Earth's atmosphere, driven by heat energy from the Sun. This means as long as the sun shines, there will be wind . The moving air (wind) has huge amounts of kinetic energy, and this can be transferred into electrical energy using wind turbines. The wind turns the blades, which spin a shaft, which connects to a generator and makes electricity. The electricity is sent through transmission and distribution lines to a substation, then on to homes, business and schools. One wind turbine can produce enough electricity to power up to 300 homes . The largest wind farm in India is located in Tamilnadu, from Nagercoil to Madurai.



Biogas: Biogas Shrubs, farm waste, animal and human waste are used to produce biogas for domestic consumption in rural areas. The organic waste is decomposed by bacteria in biogas digesters to emit biogas which is a mixture of methane and carbon dioxide. It produces huge amount of organic manure each year. Biogas is the efficient use of cattle dung. It prevents the loss of trees.

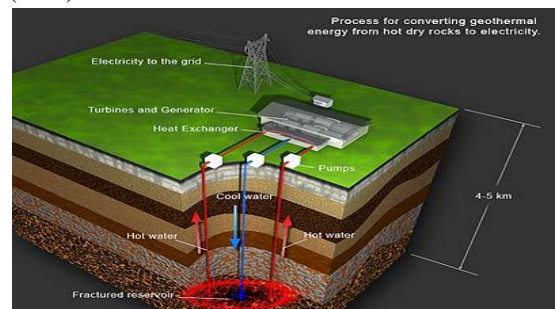


GeothermalEnergy: Deep down in the earth's crust, there is molten rock (magma). Molten rock is simply rocks that have melted into liquid form as a result of extreme heat under the earth. This can be found about 1800 miles deep below the surface, but closer to the surface, the rocks layers are hot enough to keep water and air spaces there at a

temperature of about 50-60 degrees F (10-16 degrees C). Geothermal technology takes advantage of the hot close-to-earth-surface temperatures to generate power . In India, geothermal plants are located in Manikaran inHimachal Pradesh and Puga Valley InLadakh. Geothermal Energy

It means the energy harnessed from the hot rocks present inside the earth . High temperature, high pressure steam fields exit below the earth's surface in many places. □ At the core, temperatures may reach over 9,000 degrees Fahrenheit. This heat comes from the fission of radioactive material naturally present in the rocks. The deeper regions of the earth's crust is very hot. This heat melts rocks and forms magma. The magma moves up and collects below at some places called Hot spots. The underground water in contact with hot spot gets heated into steam at high pressure. By drilling holes into hot spots the steam coming out can be used to rotate turbines of generators to produce electricity.

There are 46 hydrothermal areas in India where the water temperature normally exceeds 150 degree centigrade. □ Electricity can be generated from these hot springs. □ In many places the the hot water comes out of the ground through cracks in the form of Natural geysers:E.g. Manikaran, Kullu and sohana, Haryana. □ Earth's geothermal energy originates from the original formation of the planet (20%) and from radioactive decay of minerals (80%).



Nuclear Power: Nuclear energy is created at power plants through a scientific process that involves splitting the nucleus of atoms, a process known as nuclear fission. When this happens an enormous amount of energy is released. This kind of energy is used to create electricity by boiling water to create steam that turns turbines inside the power plant. Around 6% of the world's energy and 14% of the world's electricity is produced by nuclear power. There are over 400 nuclear power reactors in use around the world. In India, nuclear plants are located in Rawatbhata in Rajasthan, Kalapakkam in Tamil Nadu, Kakrapara in Gujarat, Tarapur in Maharashtra, Kaiga in Karnataka and Naraura in Uttar Pradesh.

□ Nuclear energy is the energy released during nuclear reactions. □ some mass is converted into energy very large amount of energy is produced during nuclear reactions. □ Nuclear reactions are of two types: □ Nuclear fission : the nucleus of a heavy atom like uranium, plutonium, etc. splits into smaller nuclei with the release of a large amount of energy. It is used to make atom bombs and to produce electricity.

Nuclear fission :In a nuclear power plant the heat energy produced by a controlled nuclear Fission chain reaction is used to produce steam which rotates the turbines of generators to produce electricity. **NUCLEAR FUSION:** □ A nuclear reaction in which small nuclei fuse together to form a heavier nucleus with the release of a very large amount of energy. The energy of sun is produced by the fusion of hydrogen nuclei to form helium nucleus. It is also used to make the hydrogen bomb.



Advantages of non-conventional energy sources:

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The non-conventional sources of energy are abundant in nature. According to energy experts the non-conventional energy potential of India is estimated at about 95,000 MW.

2. These are renewable resources. The non-conventional sources of energy can be renewed with minimum effort and money.
3. Non-conventional sources of energy are pollution-free and eco-friendly.....

Dis-advantages of non- conventional energy sources:

One disadvantage with renewable energy is that it is difficult to generate the quantities of electricity that are as large as those produced by traditional fossil fuel generators. This may mean that we need to reduce the amount of energy we use or simply build more energy facilities. It also indicates that the best solution to our energy problems may be to have a balance of many different power sources.

Another disadvantage of renewable energy sources is the reliability of supply. Renewable energy often relies on the weather for its source of power. Hydro generators need rain to fill dams to supply flowing water. Wind turbines need wind to turn the blades, and solar collectors need clear skies and sunshine to collect heat and make electricity. When these resources are unavailable so is the capacity to make energy from them. This can be unpredictable and inconsistent. The current cost of renewable energy technology is also far in excess of traditional fossil fuel generation. This is because it is a new technology and as such has extremely large capital cost.

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