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Research Article

Investigative Comparison of Various Sustainable Sources of Energy on the basis of their Benefits

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Abstract

The Renewable energy sources are reduce the greenhouse gas effect. In today increasing the demand of energy in various fields without compromise future generation need of energy. Sustainable energy includes all renewable energy source, such as hydroelectricity, biomass, geothermal, wind, wave, tidal, and solar energies are fulfill the demand of energy. Reliable supply of energy is essential in economics Industrial equipment, Lighting, transport etc. Among these solar energy most efficient available and environmentally friendly energy sources. Only wind wave, tidal, and solar energies, which are currently utilizing advanced polymer composites. Due to some harmful environmental impact such as air pollution, climate change, and natural resources decay, people are focused on using the renewable energy resources to generate energy.

Keywords: Renewable Energy, Greenhouse Gas Effect, Pollution, Eco-Friendly, Bio-Fuels, Water Cycle, Solar Technologies, Hydro- Power, Low And High pressure geothermal, Solar radiation potential.

1. Introduction:-

Renewable energy defined as energy that can be renewed and it can't be destroyed. All available energy sources in the world that come from three different primary energy sources.

1.Isotropic dissociation in the core of earth.

2.Movement of planets.

3.Thermonuclear Reaction in the earth.

- The largest energy flow comes from solar radiation, which is also responsible for the development of fossil energy sources, namely oil, coal and gas due to bio conversion which has occurred million year ago.
- Another source of energy is the geothermal energy originates from the earth surface itself. The theoretical potential of geothermal energy is much lesser (less than by an order of 4) than the solar radiation.

- The third source of renewable energy is the movement of the planets.The force of attraction between planets and gravitational pull creates tide in the sea. This energy source magnitude is very less compared to geothermal energy.

2. The Most popular non-depleting or renewable energy sources are:-

1. Solar energy
2. Hydro energy
3. Geothermal energy
4. Wind energy
5. Biomass energy
6. Tidal energy

1. Solar energy

Solar technologies are broadly characterized as either passive solar or active solar depending on the way they capture, convert and distribute sunlight. Active solar techniques include the use of photovoltaic panels, solar thermal collectors, with electrical or mechanical equipment, to convert sunlight into useful outputs. Passive solar techniques include orienting a building to the Sun, selecting materials with favourable thermal mass or light dispersing properties, and designing spaces that naturally circulate air.

Fig. 1 Solar Panel

2. Hydro Energy

Hydropower (from hydro meaning water) is energy that comes from the force moving water. The fall and movement of water is part of a continuous natural cycle called the water cycle.Hydropower is called a renewable energy source because the water on the earth is continuously replenished by precipitation. As long as the water cycle continues, we won’t run out of this energy source.

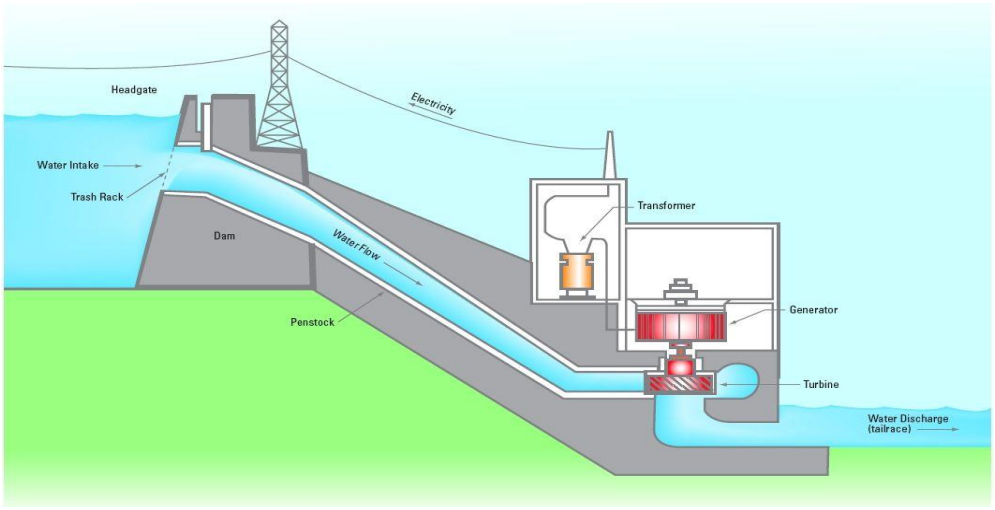

Fig. 2 Hydro-power Generation

3. Geothermal energy

This energy is taken from the earth's core. Under the surface of the earth, the temperature varies constantly as we move down inside the earth's surface. It may vary from normal room temperature to 300^0F. This difference in temperature creates a heat potential and the heat can be taken to the reservoirs of water and then by keeping the low pressure water can be boiled at a low temperature and steam can be made with this heat. Further, this steam can be used to move the turbine to generate electricity.

It can be further classified as

(i) Low temperature Geothermal
(ii) High temperature Geothermal

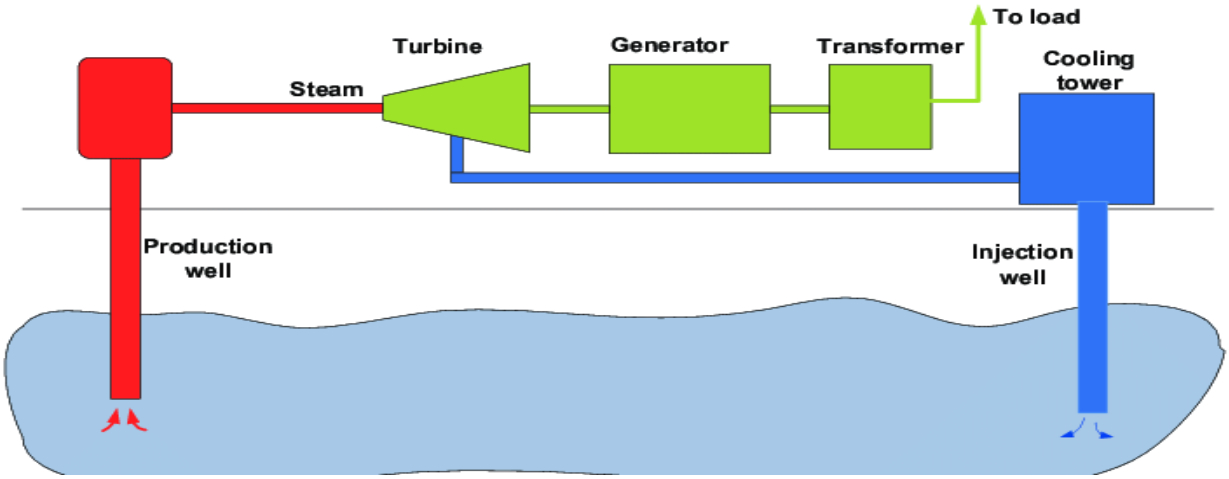

Fig. 3 Geothermal Energy

4. Wind energy

Wind energy is an indirect form of solar energy created by a combination of factors, including the uneven heating of Earth's atmosphere by solar radiation, variations in topography, and the rotation of Earth. People have been putting wind energy to use throughout history to propel sail boats, mill flour from grain, and pump water. Today the wind-induced mechanical power of huge multi-blade rotors—sweeping circles in the air as much as 100 meters in diameter—is routed to generators that produce electricity.

Wind energy, like sunlight, is a "free" source. The cost arises in converting it to electricity and integrating that electricity into the nation's power grid.

Fig 4 Wind Energy

5. Biomass Energy

Biomass is biological matter that can be used as fuel or for industrial production, and it makes a major contribution to the nation's renewable energy portfolio. Although the term is perhaps most familiar in the context of corn ethanol that is added to gasoline, biomass has many applications. Wood, which makes up about half of all biomass employed for energy, has been used by people for thousands of years to cook food and to keep warm. Grasses, agricultural crops (such as corn and sugar cane), landfill waste, and manure are other examples of biomass. Used for a variety of purposes, biomass provides energy to produce electricity, heat, chemicals, and transportation fuels (biofuels). It makes small contributions to each of the economic sectors, but the majority of this energy source goes to industry.

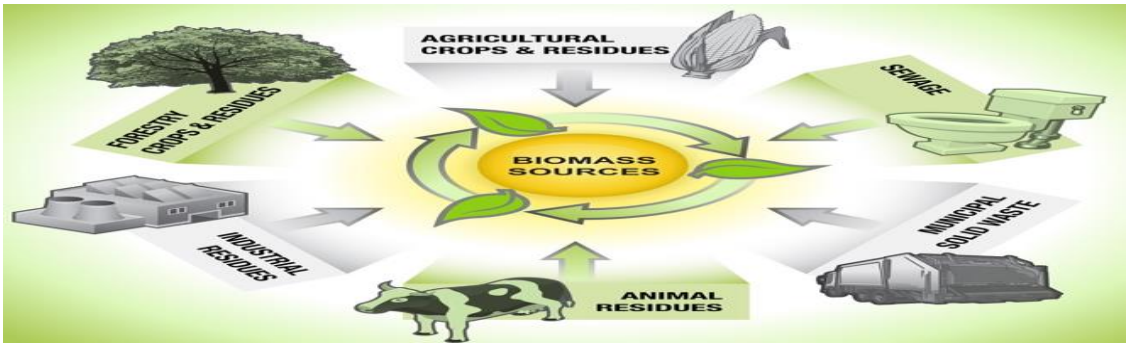

Fig. 5 Biomass Energy

6. Tidal Energy

Tidal energy is one of the oldest forms of energy generation. It is a renewable form of energy that converts the natural rise and fall of the tides into electricity. Tides are caused by the combined effects of gravitational forces exerted by the Moon, the Sun, and the rotation of the Earth.

Tidal energy presents an evolving technology with tremendous potential. However, it can only be installed along coastlines. Coastlines often experience two high tides and two low tides on a daily basis. The difference in water levels must be at least 5 meters high to produce electricity.Tidal electricity can be created from several technologies, the main ones being tidal barrages, tidal fences and tidal turbines.

Tidal power is an easy to install, renewable source of energy with no direct greenhouse gas emissions and a low environmental impact. Because the ocean's tidal patterns are well understood, tidal energy is a very predictable energy source making it a highly attractive for electrical grid management. This sets it apart from other renewables that can be more variable.Adoption of tidal technologies has been slow and the amount of power generated from tidal power plants is very small. This is largely due to the very specific site requirements necessary to produce tidal electricity.Additionally, tide cycles do not always match the daily consumption patterns of electricity and therefore do not provide sufficient capacity to satisfy demand.

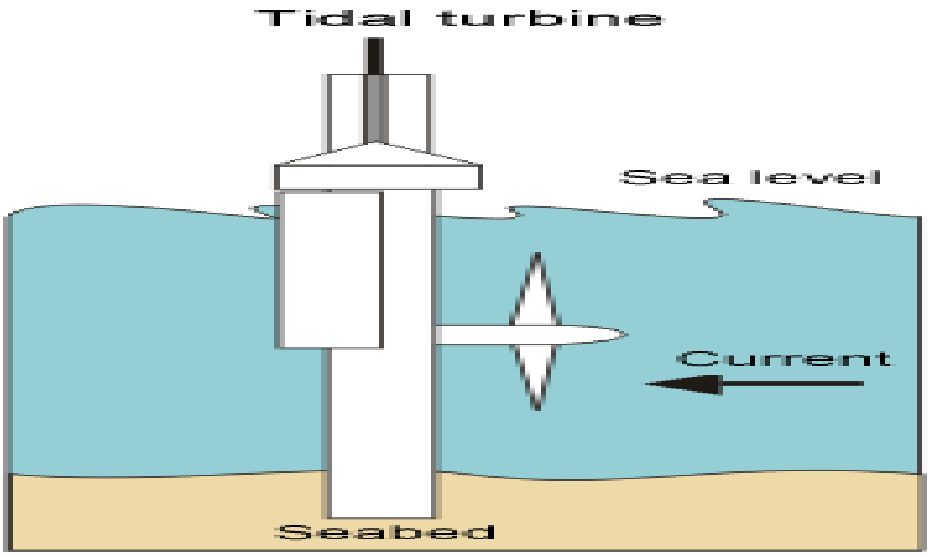

Fig. 6 Tidal Energy

3.Solar Energy Potential:-

The solar radiation potential of India is 4.7 kW/m2/day. Utilization of solar energy is of great importance to India since it lies in a temperature climate of the region of the world where sun light is abundant for a major part of the year. In various forms of technology, solar thermal applications have been in energy conversion devices, central heating, and cooking, drying and even refrigeration.

A solar cooker is proposed to be made with the help of the available materials. It is to be equipped with the parabolic collector and sun tracking device. Its efficiency is to be investigated with respect to how fast it will be able to cook the food. Hence a set of experiments were performed to determine the worthiness of this solar cooker. The main advantage of this cooker is that it can work all round the year, with a built-in auxiliary tracking system. It can easily be built with commonly available materials.

Parabolic solar cookers are very efficient. However conventional parabolic cookers need frequent adjustment to track the sun. They are also expensive. It cooks at substantially constant power for two hours without adjustment. Optimized for robustness, it can be made of low-grade material, and very wide tolerance. It is extremely reliable and very easy to use. Being efficient, it cooks without a greenhouse year-round. Variations can be made to suit locally available material.

4.Greenhouse effect:-

Visible sunlight is absorbed on the ground, at a temperature of 20ºC. Glass easily transmits short wavelength radiation, which means that it poses little interference to incoming solar energy, but it is a very poor through transmitter of long-wave radiation. Once the sun‘s energy has passed through the glass windows and has been absorbed by some material inside, the heat will not be reradiated back outside. Glass therefore act as a heat trap, Emission increases with temperature, following T4 law. The sun emits radiation like a black body whose surface temperature is about 5700ºC; this corresponds to maximum emission of 0.5Ωm. A black body at a room temperature emits radiation with a maximum at about 10Ωm, which is within the spectrum of invisible infra-red light. The infra-red light absorbed by the glass is remitted in all directions; half of it is emitted to the outside and lost, the other half re-emitted towards the black plate which absorbs it again. More and more heat is accumulated in the way in the black plate, whose temperature thus increases. Equilibrium is reached when the energy gain by absorption of visible light is exactly balanced by the loss of energy through infra-red emission of the glass plate. With rising temperature, the wavelength of the infra-red emission becomes shorter. At 200ºC (473ºK) the maximum radiation is emitted at about 6Ωm, at which wavelength, glass is partially transparent for infra-red light.

5. Scope for future work

There is a large scope solar panels and solar electricity generation is still competitive to diesel generation in oil dependent markets. Even cost per watts of solar generation is falling to new low as we speak. Every time there is a fall in energy prices or power tariffs there is fear of financial sustainability of the renewable value chain starting from the manufacturing of equipment, distribution, EPC, generation as well as wheeling to the consumers.

Energy storage is a pivotal area for renewables where day to day new development are happening.

6. Conclusion

Renewable energy sources are energy sources from natural and persistent flow of energy happening in our immediate environment. They include: bioenergy, direct solar energy, geothermal energy, hydropower, wind and ocean energy (tide and wave).

Renewable energy sources could become the major energy supply option in low-carbon energy economies. Disruptive alterations in all energy systems are necessary for tapping widely available renewable Energy sources. Organizing the energy transition from non-sustainable to renewable energy is often described as the major challenge of the first half of the twenty-first century.

In addition, technological innovations affect the cost of renewable energy technologies which in turn leads to market failures and low patronization of the renewable energy technology. In the light of this, an effective renewable energy policy should take the interconnection of factors affecting renewable energy supplies and sustainability into consideration.

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