International Journal of Scientific & Technical Development
(A Peer-Reviewed Bi-Annual Journal) ISSN: 2348-4047

GENERATIONS OF RENEWABLE ENERGY TECHNOLOGIES

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Abstract
In this Paper, green technologies and methods for the creation of renewable energy sources are reviewed. The potential for renewable energy sources to meet global energy and development needs is very high. This potential is particularly alluring in developing countries, since many regions have not yet made a firm commitment to fossil fuel dominance. The two billion people who live in rural areas and do not have access to the grid for power are notably helped by solar photovoltaic and solar thermal technologies. Because it utilises readily available agricultural waste locally, biomass energy is appealing. Other advanced technologies that are suitable for developing nations include wind energy and small hydropower resources.
Keywords:- Renewable Energy Resources, Green House Effect, Solar Energy, Generations of Technologies;

Introduction

How much of a resource should be harvested now vs in the future has been the central economic concern in the management of renewable natural resources. Time is often thought of as having passed over the economic operation or one representative management.

For instance, the economic challenge in ocean fisheries has been how much to harvest this year and how much to leave in the water to serve as a source of growth for the following season..The duration of time between harvests in a forest operation has been a topic of economic debate increases the earnings of a forest owner. Similar comparisons of deferred income flows be taken into account for renewable soil, water, or animal resources .efficient allocation..Nonrenewable energy sources have two major drawbacks: limited supply and pollution. The combustion of fossil fuels produces a large amount of carbon dioxide (CO2), a greenhouse gas. This is most likely the primary cause of the recent rise in global temperatures. Nuclear power facilities, on the other hand, are not harmful to the environment, but the compounds formed as a result of nuclear reactions are radioactive for years and must be stored in specific chambers. Renewable energy sources, on the other hand, are unaffected by any of these issues. The following are the most important renewable energy sources:

- Wind energy
- Solar energy
- Bioenergy
- Hydro energy

Renewable energy sources do not pollute the environment to the same extent that non-renewable do, but they are also not fully clean. This primarily affects biomass energy, which has the same effect as fossil fuels in terms of CO2 emissions when burned, but the carbon circle is at least closed in that case. [2]

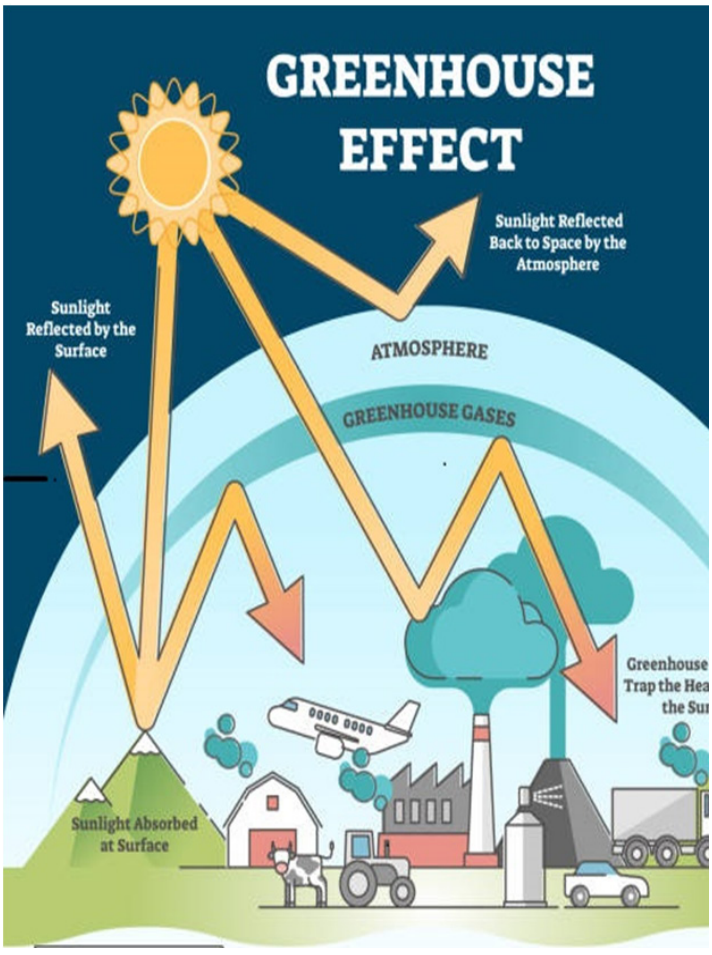

Fig. 1 Green House effect

The greenhouse effect is the way in which heat is trapped close to Earth's surface by "greenhouse gases." These heat-trapping gases can be thought of as a blanket wrapped around Earth, keeping the planet toastier than it would be without them. Greenhouse gases include carbon dioxide, methane, nitrous oxides, and water vapor. (Water vapor, which responds physically or chemically to changes in temperature, is called a "feedback.") Scientists have determined that carbon dioxide's warming effect helps stabilize Earth's atmosphere. Remove carbon dioxide, and the terrestrial greenhouse effect would collapse. Without carbon dioxide, Earth's surface would be some 33°C (59°F) cooler.

The expense and small volume of renewable energy sources (water energy excluded) are the two biggest issues, of newly acquired energy Renewable energy sources have enormous promise, but our current technological advancement prevents us from solely relying on them. The "Greenhouse Effect" is seen in this image. The earth reflects some of the sun's reflected radiation as greenhouse gases (CO2, N2O, CH4, HFC, PFC, and SF6), and this effect is responsible for Earth's temperatures. Due to the increasing concentration of CO2 during the last century, greenhouse effects have been strengthening over the period[3]. As a result, the average temperature of the Earth rises globally. Ice melting, rising sea levels, agriculture impacts, and so on are all consequences of global warming. If the greenhouse effect did not exist, the earth's temperature would be approximately 30°C lower than it is now. Wood and biomass burning, deforestation, and fossil fuel combustion are all major producers of CO2.

2. GENERATIONS OF RENEWABLE ENERGY TECHNOLOGIES

Renewable energy encompasses a wide range of sources and technologies at various levels of development. The International Energy Agency (IEA) has identified three generations of renewable energy technology over the years:

Hydropower, biomass combustion, geothermal power, and heat are examples of first-generation technologies that emerged around the end of the nineteenth century as a result of the industrial revolution. These technologies have a huge following. Second-generation technology includes solar heating and cooling, wind power, various types of biofuels, and solar photovoltaic. As a result of investments in research, development, and demonstration since the 1980s, they are now entering the market. Concerns about energy security following the oil crises of the 1970s prompted the initial investment, but these technologies' long-term appeal is due, at least in part, to environmental benefits. Many of the innovations are based on significant technological breakthroughs. Among the third-generation technologies still under development are advanced biomass gasification, biorefinery technologies, concentrated solar thermal power, hot-dry-rock geothermal power, and ocean energy. Nanotechnology breakthroughs have the potential to make a big impact.[4]

3. SOLAR HEATING

Solar heating systems are a well-known second-generation technology that consists of solar thermal collectors, a fluid system to transport the heat from the collector to the point of use, and a reservoir or tank to store the heat. Household hot water, swimming pools, and residential and commercial buildings may all benefit from these systems. The heat can also be used in industrial operations or as a source of energy for other applications, such as cooling.

4. BENEFITS OF RENEWABLE ENERGY

The following are some of the most significant advantages of renewable energy:

They are a renewable resource. It is one of the most significant advantages of alternative energy since renewable energy is always available for widespread usage and does not deplete like fossil fuels. The sun, wind, tides, and other natural forces will always be available for humans to use.

Municipal solid trash is being phased out. Alternative energy benefits include not only removing vast volumes of garbage now destroying the environment but also converting this junk into a benefit through waste to energy plants. These factories treat municipal waste, converting it to electricity and removing it from the environment.

Energy production on a small scale. Producing locally has several advantages in terms of alternative energy. This comprises decreasing transportation costs and benefits for local economies from the company putting up factories using alternative energy sources. It will no longer be necessary to import fossil fuels from other countries at exorbitant prices. There will be no need for foreign energy if there are several plants of alternative energy sources in the country.

Improved national security Alternative energy sources do not rely on foreign oil, which can be politically hostile to the United States at times. It also implies that

foreign countries do not have control over the market, which is potentially volatile. Foreign dependency is completely reduced with alternative energy sources.
It is more environmentally friendly. One of the most significant advantages of alternative energy is that it is far more environmentally friendly than present fossil fuel use. Alternative energy sources do not emit carbon dioxide, and their recovery causes little or no environmental damage. Fossil fuels, such as gas and oil, emit large amounts of greenhouse gases, which contribute significantly to global warming.[5]
A future that is healthier and cleaner. Alternative energy sources give solutions to the concerns of global warming, and they may repair some of the damage that has already been caused by the usage of fossil fuels. All of this contributes to making our planet a healthier and cleaner place to live for future generations. If we work together, we can Price stability has improved. Alternative energy has numerous advantages, including constant availability and sustainability, as well as being significantly less expensive and stable. For each area allocated to alternative energy sources, a mix of strategies is employed to keep energy costs from changing in the way that oil and gas prices do.

Fig. 2 Solar Plates

This helps to keep the pricing of alternative energy sources steady and prevents market instability.

5. DISADVANTAGES OF ALTERNATIVE ENERGY

Alternate energy sources have the following disadvantages:
No Constant Supply. The energy supply is dependent on nature and, thus, is not constant, e.g., solar energy. The same may be said about wind energy. Wind farms can only generate power in the countryside or other such regions where turbines can receive wind without being obstructed. The situation is better with hydroelectricity (or water energy) because once power is created at the dams, it can be extracted through wires and sent across long distances.[6]
Implementation Problems This is one of the main reasons why alternative energy isn't popular. Alternative energy sources have been used by many industries. They, on the other hand, withdraw as soon as they realize it would be too expensive.
It is costly to use. In terms of cost, fossil fuels are less expensive to utilize than alternative energy. Fossil fuels are easily available, maybe stored anywhere, and can be transferred using standard transportation methods. Solar electricity is expensive to utilize in everyday life. The cost per KWH might range from 20 to 25 cents. Dependant on Seasons. Biomass is generally produced from corn, wheat, barley, and similar crops all of which are seasonal. Thus biomass can only be produced only in certain seasons. Energy/Hydropower: Hydropower (water energy) often damages the surrounding environment. It has a well-known effect on fish. Many people consider hydropower plants to be ecological blight. Damming also reduces the amount of oxygen dissolved in the water. It would be erroneous to assert that alternative energy has no drawbacks.[7]

6. NON-TECHNICAL BARRIERS TO ACCEPTANCE

The main impediments to the broad commercialization of renewable energy technology are political rather than technical, and several studies have found a variety of non-technical hurdles to renewable energy use. The following are some of the most significant obstacles: Lack of government policy support, which includes the absence of policies and regulations that assist the deployment of renewable energy technology as well as the presence of rules and regulations that both impede and encourage renewable energy development. Subsidies for fossil fuels, a lack of consumer-based renewable energy incentives, government insurance for nuclear plant accidents, and complicated renewable energy zoning and approval processes are just a few examples.[8]
Consumer awareness and information transmission are lacking. Renewable energy technologies have a greater capital cost than traditional energy systems. Inadequate funding alternatives for renewable energy projects, including project developers, entrepreneurs, and consumers having insufficient access to reasonable finance. Failing to absorb all costs of conventional energy (e.g., consequences of air pollution, the danger of

supply interruption) and failure to internalize all benefits of renewable energy are examples of imperfect capital markets (e.g., cleaner air, energy security). Lack of necessary scientific, technical, and manufacturing skills required for renewable energy generation; lack of dependable installation, maintenance, and inspection service and the inability of the educational system to give adequate training in new technologies. Codes, standards, utility connections, and net-metering rules are all lacking.[9] Poor public perception of renewable energy system aesthetics. Lack of stake holder/community participation and co-operation in energy choices and renewable energy projects.

7. CONCLUSION

Evidence of worldwide renewable resource decline is apparent along both socioeconomic and ecological gradients. Statistics on ocean fishery depletion, forest land conversion, topsoil loss, desertification, species extinction, and freshwater diminution, overwhelmingly point to the consequences of human domination of the planet's resources. This data has most often been presented as smooth, continuous trends. However, perhaps most striking is recent research on catastrophic shifts in entire ecosystem types. An October 2001 article in Nature (Vol. 413, pp. 591-596) presents evidence of dramatic flips in state apparent in lake, coral reef, woodland, desert, and ocean systems resulting from continuous, incremental pressure. Optimal control theory, as presented in Section 2, has been the dominant 20th century paradigm behind the analysis of and policy advice in renewable resource systems. At the dawn of the 21st century and in the wake of worldwide renewable resource decline, policy-makers and resource economists alike are in search of a broader, more holistic view of complex and interdependent socio-ecological systems. Many have taken an approach of improving upon the old framework, as evident by the option value approach presented in Section 3. Others have looked beyond traditional disciplinary walls for entirely different perspectives on renewable resource management, for instance, the complex adaptive systems approach presented in Section 4. Neither discussion above is meant to be an exhaustive treatment of an economic nor natural science based approach to renewable resource systems, but rather highlights the key differences in foundation. Most dramatic is the seemingly polar extremes of the economist's focus on efficiency and the natural scientist's focus on resilience. At the heart of nearly all economic models of renewable resources is the goal of efficiency, where marginal benefits of the next resource put to economic use is exactly equal to its marginal cost of production and/or to society. This approach has been successful in generating maximum short-run returns to capital investment, however, has failed to consider the importance of scale and the consequences of unpredictable discontinuous change. Socio-ecological complexity is just simply too overwhelming to manage at the margin. A focus on resilience, in contrast, could help define the boundaries of the system in which economic actors can then go about the calculus of maximization.

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