



TITLE : RENEWABLE ENERGY RESOURCE

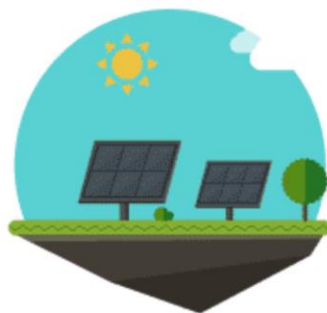
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RENEWABLE ENERGY RESOURCE



Solar energy



Wind energy



Hydroelectricity

ABSTRACT

The importance of renewable energy sources in combating climate change and the world energy crisis is examined in this case study. It offers a thorough examination of solar, wind, hydropower, biomass, and geothermal energy with an emphasis on economic viability, environmental advantages, and technological improvements. The considerable potential of solar and wind energy is emphasized by their declining costs and rising efficiency, as well as their expanding offshore installations and technological advancements. Despite its effectiveness, hydropower has social and environmental problems. Although it uses organic materials, biomass energy needs to be managed sustainably. Although it has a consistent source, geothermal energy is expensive to create and has limited geographic reach.

Strengths include lower greenhouse gas emissions, more job development, and improved energy security, according to survey results from academics, industry professionals, and the general public. However, there are certain difficulties, including the erratic nature of wind and solar power, large upfront expenditures, and inconsistent policy. According to the study's findings, climate mitigation and sustainable development require the use of renewable energy sources. Realizing their full potential requires overcoming obstacles with creativity, helpful laws, and public awareness. Governments, businesses, and communities must work together to ensure the future of renewable energy.

INTRODUCTION

Renewable energy resources, such as solar, wind, hydropower, biomass, and geothermal energy, come from naturally occurring processes that replenish themselves continuously. Renewable energy sources provide a sustainable substitute for fossil fuels with less of an adverse effect on the environment. The effort for carbon footprint reduction and climate change mitigation on a worldwide scale has sped up the development of renewable

energy technology. The objective of this case study is to present a thorough examination of renewable energy sources, emphasizing their significance, present situation, and potential for the future.

LITERATURE REVIEW

To give readers a complete understanding of renewable energy resources, the literature review includes information from a variety of sources, such as government papers, industry reports, and academic journals.

SOLAR ENERGY



Solar thermal systems and photovoltaic (PV) cells are used to harvest solar energy. In contrast to solar thermal systems, which utilize sunlight to heat a fluid before turning it into steam to power a turbine, photovoltaic cells use sunlight to immediately convert it into energy. Over the last ten years, solar energy has become increasingly affordable, positioning it as one of the most economical forms of renewable energy. Studies show that in recent years, there have been notable cost savings and efficiency gains. High sun insolation areas benefit most from solar energy, and its modular design makes it suitable for a variety of uses, from huge solar farms to small-scale home systems (International Energy Agency, 2023).

WIND ENERGY



Wind turbines are devices that harness wind energy by converting its kinetic energy into mechanical power, which can then be transformed into electrical power. Wind energy is one of the renewable energy sources with the quickest rate of growth. Due to their greater wind speeds and less obtrusive appearance than onshore turbines, offshore wind farms are becoming more and more popular. Recent developments have concentrated on wind power integration into the grid and boosting turbine efficiency, size, and reliability. In coastal and broad plains regions with continuously high wind speeds, wind energy is especially feasible (Global Wind Energy Council, 2023).

HYDROPOWER



Using the gravitational force of falling or flowing water, hydropower produces energy. Run-of-river systems, small-scale hydropower, and conventional big dams are all included. Large dams can provide a lot of energy and help with flood management and water storage, but they can also have negative effects on the environment and society, like uprooting local residents and disturbing their ecosystem. Run-of-river and small-scale hydro systems are less harmful to the environment and can be implemented in a variety of geographic areas. In many nations, hydropower continues to be a dependable and steady source of renewable energy, making a substantial contribution to the energy mix (World Bank, 2023).

BIOMASS



Plant and animal waste are examples of organic materials that can be converted into biomass energy. It can be burned, undergo biological reactions (such as anaerobic digestion), or undergo thermochemical reactions (pyrolysis and gasification) to produce energy. The potential of biomass energy to use forest and agricultural scraps is highly commended

because it may reduce waste and provide a renewable energy source. However, given that large-scale biomass production might compete with food production and result in deforestation, sustainability and land use issues remain crucial (Bioenergy Europe, 2023).

GEOTHERMAL ENERGY



Geothermal energy uses heat from the Earth's core to generate electricity and heat directly. Unlike sporadic energy sources like solar and wind, geothermal power plants usually have large capacity factors and can deliver a steady and continuous energy supply. Geothermal energy's primary drawbacks are its spatial dependence and the hefty upfront expenses of drilling and plant construction. Nonetheless, areas with high geothermal activity, including western USA and Iceland, have effectively utilized this resource to meet a sizable fraction of their energy needs (Geothermal Energy Association, 2023).

THE OUTCOME OF THE SURVEY

Industry experts, researchers, and members of the public were surveyed to determine the practical consequences of renewable energy resources. The perspective, advantages, and disadvantages of adopting renewable energy were the main topics of the poll.

STRENGTHS:

Environmental Benefits: When compared to fossil fuels, renewable energy sources drastically lower greenhouse gas emissions and air pollution. In addition to mitigating the effects of climate change, this lowers the risk of respiratory and cardiovascular illnesses brought on by pollution.

Economic Opportunities: The generation of jobs has been significantly aided by the renewable energy sector. The International Renewable Energy Agency (IRENA) estimates that 11.5 million jobs related to renewable energy were created globally in 2019. Employment in the production, setup, and upkeep of renewable energy systems supports local development and economic expansion.

Energy Security: By reducing reliance on imported fossil fuels, diversifying energy sources with renewables improves national energy security. Utilizing domestic renewable resources can help nations become less vulnerable to changes in the world energy market.

WEAKNESSES:

Problems with Intermittency: The availability of solar and wind energy is dependent on the weather, making them intermittent sources. To guarantee a steady supply of energy, this intermittency calls for the creation of dependable energy storage technologies and sophisticated grid management strategies.

Starting Prices: Although the cost of renewable energy technologies has dropped, infrastructure and technology implementation still require a large upfront investment. This covers the price of setting up wind turbines, solar panels, and related grid infrastructure improvements.

Public Opinion and Legislation: Adoption of renewable energy technologies can be hampered by inconsistent legislation, a lack of public knowledge, and opposition to change. Strong, durable legislative frameworks and public education are crucial for accelerating the switch to renewable energy.

CONCLUSION

A key component of the global energy issue and climate change mitigation is the use of renewable energy sources. The benefits in terms of economic growth, energy security, and environmental sustainability outweigh the costs and challenges associated with intermittency and regulation. Realizing the full potential of renewable energy and overcoming these obstacles require sustained innovation, policy backing, and public awareness. To build a sustainable energy future, communities, businesses, and governments must work together.

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