



ISSN: 0973-3469, Vol.20, No.(2) 2023, Pg. 85-87

Material Science Research India

www.materialsciencejournal.org

Enlightening of Sustainable Energy Resources for Green Technology

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Article History

Publishing date: 24 August 2023

Introduction

Energy is the capacity of a physical system to perform work. Energy must be transferred to an object to perform work on it. Various resources of energy include the following:

Radiant Energy

It is the energy of electromagnetic waves. For example, energy of the photons (particles of light) from the sun, the energy possessed by vibrating particles, X-rays, electricity, radio waves and so on.

Thermal Energy

Energy that comes from the heat is called thermal energy. This heat is generated by movements of atoms or molecules within an object. The faster these particles move; the more heat is generated. For example, when we boil water thermal energy transfer from stove to the metal container.

Nuclear Energy

Energy that holds the nucleons of an atom is called the nuclear energy. It is associated with nuclear processes like decay, fission and fusion. In nuclear decay, unstable nucleus releases radiation and loses energy. Fission energy is released when one heavy atom splits into lighter atoms. Fusion energy is released when two lighter nuclei are fused together to form a heavier atom. Fusion process occurs in stars naturally, fission process does not normally occur in nature. Nuclear power plants use fission process to obtain nuclear energy. Electrical energy: Energy stored in the charged particles within an electric field is called electrical energy. Electric fields are simply areas surrounding a charged particle. Electric field of one charged particle exerts

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Doi: <http://dx.doi.org/10.13005/msri/200201>

force on other charged particles within field. This force produced by field causes particles to move. Electrical energy is used to move charged particles through wires from power plant to houses.

Mechanical Energy

Energy possessed by an object due to its motion or position or both is called mechanical energy. It is the sum of kinetic energy and potential energy. For example, when a simple pendulum is at maximum height its potential energy is maximum and kinetic energy is minimum.

Chemical energy

Energy stored in the bonds of chemical compounds is called chemical energy. Chemical energy is often released during chemical reaction in form of heat energy in exothermic reactions. In exothermic reactions heat energy is absorbed from the surroundings and used in chemical reaction.

Energy: Renewable Sources

Renewable energy is produced using natural resources and are continuously replenishing. These sources of energy are derived from nature and most of renewable energies depend in one way or another on sunlight. Renewable energy sources are easily available and have low environmental impact.

Biomass

Biomass power uses renewable organic waste like dead plants, scrap lumber, grass, leaves, crops, manure, garbage animal waste. In biomass power plant waste is burned to produce steam and that steam runs a turbine which is used to generate electricity.

Solar Energy

Solar energy is the term for power produced by the sun's rays. It is one of the most plentiful and sustainable sources of energy on the planet. Through the use of various technologies, solar energy may be captured and transformed into a variety of useful types of energy, including heat and electricity. The shift to a cleaner, more sustainable energy future depends heavily on solar energy. It is becoming more and more competitive with conventional energy sources as technology develops and economies of scale are realized, assisting in the reduction of carbon emissions and the fight against climate change.

Wind Energy

Another type of renewable energy that uses the wind to produce electricity is wind energy. The kinetic energy of moving air is converted into mechanical energy, which is subsequently transformed into electrical energy, via wind turbines, also referred to as windmills or wind generators. A more sustainable and climate-friendly energy mix can be achieved through diversifying energy sources, cutting greenhouse gas emissions, and incorporating wind energy, solar energy, and other renewable energy sources.

India's Sustainability of Energy Perspective

India's stance on renewable energy sources is shaped by the country's particular prospects and difficulties. India, one of the most populous nations in the world with fast urbanization and industrialization, faces a rising demand for energy while also attempting to lessen its negative environmental effects and decrease its reliance on fossil fuels. The following main elements outline India's viewpoint on renewable energy sources:

Energy Security and Independence

India's energy demand is projected to increase significantly in the coming years. To ensure energy security and reduce its reliance on imported fossil fuels, India is keen on developing domestic sources of renewable energy. This approach aligns with the country's goal of achieving energy independence and reducing vulnerability to international energy price fluctuations.

Renewable Energy Targets

India has set aggressive goals for renewable energy, hoping to reach 175 GW of capacity by 2022 and 450 GW by 2030. This covers energy sources including sun, wind, hydro, and biomass. These goals show India's dedication to making the switch to a low-carbon energy system.

Solar Power Revolution

India enjoys plenty of sunlight all year round, making solar energy a valuable resource. The government has started programmes like the "Make in India" campaign to encourage domestic production of solar equipment, which will lower costs and expand the use of solar energy.

Wind Energy Development

India's onshore and offshore wind energy potential is substantial, especially in coastal regions. Policies like feed-in tariffs and competitive bidding have driven growth in the wind energy sector, contributing to India's renewable energy mix.

Bioenergy and Biomass

India's agriculture industry is very extensive, and as a result, there is a lot of waste produced. By using this biomass to produce electricity, we can contribute to the energy mix and address waste management challenges. Producing biogas from organic waste also has promise, particularly in rural regions.

Challenges and Roadblocks

India struggles to finance renewable energy projects, integrate intermittent sources into the system, and overcome regulatory barriers, despite its best efforts. It is a challenging undertaking to strike a balance between the requirement for universal access to affordable energy and the shift to sustainable energy.

International Cooperation

India actively engages in international discussions on climate change and sustainable development. It collaborates with other countries and organizations to share experiences and best practices in the development of sustainable energy and is dedicated to the objectives of the Paris Agreement.

Conclusion

In summary, India views sustainable energy resources from the perspectives of achieving energy security, lowering greenhouse gas emissions, and fostering economic growth. The nation's dedication to expanding its renewable energy capacity demonstrates its understanding of the social and economic advantages of switching to a more sustainable energy mix.

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