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Short Communication

Assessing the Values and Recent Advancements of Thermal Energy in Daily Life Activities

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DESCRIPTION

Thermal energy, a form of kinetic energy associated with the movement of particles within a substance, plays a vital role in our daily lives. It provides energy to households, businesses, and even the global climate system. As everywhere is at variance with the challenges of climate change and the need for sustainable energy sources, using thermal energy has emerged as a key strategy to reduce our carbon footprint and transition to a greener future [1].

This article explores the concept of thermal energy, its sources, and its various applications in a world striving for sustainable solutions. Thermal energy is a form of internal energy possessed by a substance due to the movement of its constituent particles, such as atoms and molecules. This kinetic movement creates heat, which can be transferred from one body to another [2].

It is important to distinguish between thermal energy and temperature; while temperature measures the average kinetic energy of particles, thermal energy accounts for the total energy of the particles in a substance. The sun is the ultimate source of thermal energy for our planet. Solar radiation provides heat and light, which can be captured and converted into usable energy through solar panels and solar thermal systems [3,4].

Mechanisms of thermal energy

This energy source is derived from the heat stored beneath the Earth's surface. It can be harnessed through geothermal power plants and used for heating and electricity generation. Fossil fuels, including coal, natural gas, and oil, have been the primary source of thermal energy for centuries. However, they release greenhouse gases and contribute to climate change, making them unsustainable in the long run [5].

Organic matter such as wood, crop residues, and animal waste can be burned to release thermal energy. This energy source is considered renewable when managed sustainably. Nuclear reactions generate immense thermal energy, which is converted into electricity in nuclear power plants. While it is low in carbon emissions, nuclear energy comes with its own set of challenges, including nuclear waste disposal [6,7].

Heating and cooling is one of the most common uses of thermal energy is in heating buildings and providing warmth during the winter.

Conversely, it can be using for cooling through air conditioning and refrigeration systems. Thermal energy is a primary driver for electricity generation in power plants. Steam turbines, often powered by heat from various sources, produce electricity that powers homes and industries. Many industrial processes rely on thermal energy for operations such as metal smelting, glass manufacturing, and chemical production [8,9].

The high temperatures generated by thermal energy are essential in these applications. Internal combustion engines, used in most automobiles and airplanes, rely on the thermal energy generated. In recent years, the increasing depletion of fossil fuels and resulting environmental problems have prompted the global consensus on achieving carbon neutrality.

Utilizing renewable energy sources as substitutes for fossil fuels is crucial in addressing energy and environmental issues [10].

CONCLUSION

Thermal conversion offers the highest energy conversion efficiency because it uses sun energy directly. However, solar thermal conversion efficiency is limited by the intermittent nature of solar energy.

To ensure the continuous operation of the equipment, thermal energy can be supplied by electro thermal conversion, which has various applications such as heating, electric driving, and providing support for other energy sources. Despite their usefulness, both solar energy and electric energy from renewable energy sources are volatile, which can lead to difficulties in maintaining a stable energy supply.

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