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REVIEW

Self-sustaining energy as an alternative to power outages

Energía autosustentable como alternativa a los cortes de energía eléctrica

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ABSTRACT

Introduction: self-sustaining energy is in full force, since there are various problems caused by the excessive use of electric energy and it contributes to the reduction of greenhouse gas emissions and the mitigation of climate change.
Objective: to characterize aspects related to self-sustaining energy as an alternative to power outages**.**
Method: a review of the bibliography available in databases such as SciELO, Scopus and ClinicalKey was carried out, from which a total of 12 related articles were consulted, empirical methods such as logical history and analysis and synthesis were used.
Results: energy sustainability refers to the ability to meet energy needs. Renewable energy refers to energy sources that are naturally renewed and that are virtually inexhaustible, self-sustaining energy can also contribute to the reduction of greenhouse gas emissions. The problem of power outages is a global challenge for which self-sustaining energy is presented as a viable alternative. The self-sustaining energy system should be designed with a focus on resilience and security.
Conclusions: the need for policies and programs that promote the adoption of self-sustaining energy and address the identified barriers is highlighted. Furthermore, it suggests that the successful implementation of these technologies could improve energy resilience and enhance the quality of life.

Keywords: Self-sustaining Energy; Power Outages; Mechanical Energy; Electric Energy; Power Generator.

RESUMEN

Introducción: la energía autosustentable está en plena vigencia, ya que existen diversos problemas causados por el uso excesivo de energía eléctrica y contribuye a la reducción de las emisiones de gases de efecto invernadero y a la mitigación del cambio climático.
Objetivo: caracterizar aspectos relacionados con la energía autosustentable como alternativa a los cortes de energía eléctrica.
Método: se realizó una revisión de la bibliografía disponible en bases de datos como SciELO, Scopus y ClinicalKey de las cuales se consultaron un total de 12 artículos relacionados, se utilizaron métodos empíricos como el histórico lógico y de análisis y síntesis.
Resultados: la sostenibilidad energética se refiere a la capacidad de satisfacer las necesidades energéticas. La energía renovable se refiere a las fuentes de energía que se renuevan naturalmente y que son virtualmente inagotables, la energía autosustentable también puede contribuir a la reducción de las emisiones de gases de efecto invernadero. El problema de los cortes de energía eléctrica es un desafío global para el cual la energía autosustentable se presenta como una alternativa viable. El sistema de energía autosustentable debe diseñarse con un enfoque en la resiliencia y la seguridad.
Conclusiones: se destaca la necesidad de políticas y programas que promuevan la adopción de energía autosustentable y aborden las barreras identificadas. Además, sugiere que la implementación exitosa de estas tecnologías podría mejorar la resiliencia energética y mejorar la calidad de vida.

Palabras clave: Energía Autosustentable; Cortes de Energía Eléctrica; Energía Mecánica; Energía Eléctrica; Generador de Energía.

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INTRODUCTION

The issue of self-sustaining energy is currently in force, as there are various problems caused by the excessive use of electrical energy, which contributes to reducing greenhouse gas emissions and mitigating climate change. Using energy generated by human movement, like a bicycle connected to a generator, is a way of harnessing clean, renewable energy.[1]

Several authors agree that the haste and determination to achieve profits, as economic models demand, has neglected two elements that interrelate with the economy: society and the environment. This is why the overexploitation of resources has not been respected only by this generation but has also not been thought of or reflected on the progeny of tomorrow, generating socio-environmental conflicts.[2,3,4,5,6]

Power outages are a common problem in many parts of the world due to various reasons, such as extreme weather conditions, failures in the electrical infrastructure or excessive demand, which can have serious consequences, such as the interruption of medical services, the paralysis of industrial and agricultural production, among others. Having self-sustaining energy systems can help mitigate the impact of these outages by providing a continuous alternative energy source.[7]

Therefore, it is important to consider self-sustaining energy as a viable alternative to mitigate the risks of power outages. Self-sustaining energy refers to the ability to produce energy independently and sustainably using renewable energy sources such as solar, wind, and hydraulic power, among others. In addition to reducing dependence on fossil fuels, self-sustaining energy also contributes to reducing greenhouse gas emissions, promoting a healthier environment.

Current technological advances and growing awareness of the importance of environmental sustainability have driven the development of innovative projects in self-sustaining energy. Without a doubt, these advances promise to contribute positively to the care of the planet shortly. In this context, using a treadmill motor as a power generator has become a viable option and solution for regions lacking electricity access.[8]

Developing self-sustaining energy systems can provide a reliable and continuous energy source, reducing dependence on the traditional electrical grid and increasing resilience to power outages. Generating energy from renewable and self-sustaining sources, such as the mechanical energy harnessed by DC motors, is essential to reducing greenhouse gas emissions and mitigating climate change. Researching and developing DC motor-based systems encourages adopting more sustainable and environmentally friendly practices.[9]

In many parishes in the sector, especially in rural or remote areas, access to electricity is limited or non-existent. Self-sustaining energy systems can provide a solution to improve access to energy in these communities, which can positively impact the quality of life, education, health, and economic development.[9]

Power outages occur worldwide, mainly in developing countries and rural areas, where electrical infrastructure is often scarce or deficient. In addition, the growing demand for electricity, caused by economic development and the expansion of technology, has led to an increased need for efficient and sustainable energy solutions.

In view of the above, this article aims to characterize aspects related to self-sustaining energy as an alternative to power outages.

METHOD

The available literature was reviewed using articles retrieved from databases such as SciELO, Scopus, and ClinicalKey. Filters were used to select articles in English and Spanish, and empirical methods such as logical history analysis and synthesis were used to compile and understand the information obtained. The terms “Self-sustaining Energy,” Power Outages,” Mechanical Energy,” Electrical Energy,” and” “Energy Generator” were used as keywords in the article. A total of 12 references were selected that addressed different considerations about self-sustaining energy.

RESULTS

Energy sustainability refers to the ability to meet current energy needs without compromising the ability of future generations to meet theirs. Self-sustaining energy from renewable sources, such as that generated by a motor-driven bicycle generator, is considered a more sustainable alternative to fossil fuels because it uses naturally available resources in a renewable way.[9]

Renewable energy refers to sources that are naturally replenished and virtually inexhaustible on a human timescale. Energy generated by human movements, such as pedaling a bicycle connected to a generator, is considered a form of renewable energy as it does not deplete finite resources or produce harmful emissions during its generation.[5]

The focus on small-scale power generation involves decentralized energy production on a local scale rather than relying exclusively on large power plants. The use of a motor generator and bicycle provides a form of small-scale power generation that can be implemented in homes, communities, or remote locations to increase energy autonomy.[10]

Energy efficiency is the relationship between the amount of sound energy produced by a system and the amount consumed to make it. Motor and bicycle generators can be designed to be relatively efficient in converting kinetic energy into electrical energy, maximizing their ability to mitigate power outages.

Community resilience refers to a community’s ability to withstand, adapt, and recover from power outages. Implementing self-sustaining energy systems through motor and bicycle generators can strengthen community resilience by providing a local and reliable energy source during emergencies.[10]

The active participation of community members in the planning, implementation, and maintenance of self-sustaining energy systems can be critical to their long-term success. Creating educational and training programs can encourage community participation and empowerment in managing their energy.

These conceptual bases and theories provide a solid framework for understanding the use of self-sustaining energy as an

alternative to power outages in the sector. For example, a power generator from a motor and a bicycle can be used. By considering these principles, effective strategies can be designed and implemented to improve energy resilience and promote community sustainability.

Self-sustainable energy is a viable alternative to solving the problem of power outages, as it allows communities to generate their energy using natural and renewable resources. For example, installing solar panels or wind turbines can provide sustainable and reliable energy throughout the day, even at times of high demand or during power outages.[9]

In addition, self-sustaining energy can also contribute to reducing greenhouse gas emissions, which helps mitigate climate change and its negative impacts on the environment and human health. Notably, the transition to a self-sustaining energy-based economy requires significant investment in technology, infrastructure, training, and adequate policies and regulations for its development and expansion. However, the potential long-term benefits of economic, environmental, and social sustainability may outweigh the initial costs.[11]

Power outages are a global challenge, and self-sustaining energy is a viable and necessary alternative. Implementing sustainable and reliable solutions can improve people's quality of life and reduce negative environmental and public health impacts.

The self-sustaining energy system must be designed to focus on resilience and safety. Measures must be taken to ensure the system's reliability and minimize the risks of power outages, such as implementing backup systems and safety protocols. Regulatory and legal aspects related to implementing a self-sustaining energy system at the neighborhood level must be considered. This may include building permits, environmental regulations, and electrical safety regulations.[11]

Currently, the global trend is focused on the use of renewable energies, which are environmentally friendly, taking advantage of natural resources to generate them. Renewable energy sources have become a priority issue on the energy agenda, both in industrialized countries and many developing economies, thanks to their beneficial economic, social, and environmental effects. Thus, the importance of having alternative energy sources to meet the demand of large nations is highlighted by providing for the expansion of growth in alternative sources.[10]

Self-sustaining energy is obtained from renewable sources that are not depleted through use. It is based on continuously renewing natural resources like solar, wind, hydroelectric, geothermal, and biomass energy. This type of energy is considered sustainable because it does not compromise resources for future generations and has a lower environmental impact than non-renewable energy sources, such as fossil fuels. Self-sustaining energy promotes energy independence, reduces greenhouse gas emissions, and mitigates climate change.[9]

Power outages are temporary interruptions in the electricity supply that affect a specific geographical area or an entire electrical system. These outages can be caused by a variety of reasons, including:[11]

- Failures in the electrical grid: Technical problems in transmission lines, electrical substations, or distribution equipment can cause power outages.
- Adverse weather conditions, such as storms, hurricanes, heavy snowfall, strong winds, or extreme temperatures, can damage the electrical infrastructure and cause power outages.
- Scheduled maintenance: electricity companies sometimes have to carry out maintenance or upgrade work on the electricity grid, which may require a temporary supply interruption.
- Network overloads: Excessive energy consumption, mainly during periods of high demand, can overload the electricity network and cause power cuts.
- Power generator failures: Technical problems in power stations or distributed generation systems can cause power cuts in specific areas.

Given the growing importance of this issue, the energy policies of different countries have focused on gradually increasing the supply of renewable energy, developing a development strategy for other regions, such as the European Union, South America, and Central America, to find a way to exploit natural resources for energy production, minimizing the environmental impact of human activity on the natural environment.[7]

Energy sources are defined as the resources existing in nature from which humanity can obtain energy that can be used in its activities. In turn, these energy sources originate from non-renewable and renewable sources, depending on the energy consumption required by human beings. However, at present, some problems related to world economic development are concerned with the energy capacity of each country. There are different energy sources, which can be classified into two main groups:[12]

- Non-renewable sources: these are available in limited quantities and are depleted by use, such as fossil fuels (coal, oil, natural gas). These have the characteristic that they cannot be used again once used for energy generation.
- Renewable sources: Renewable energy sources are those which, due to their characteristics, are inexhaustible, even if their availability is intermittent, and their use does not cause profound alterations to the environment. This type of energy is defined as that which, properly managed, can be exploited indefinitely; its available quantity does not decrease as it is used.

Implementing self-sustaining energy systems based on a motor generator and bicycle can significantly contribute to the sustainability and energy autonomy of communities by reducing their dependence on the conventional electricity grid and fossil fuels.

These systems provide a localized and reliable energy source that can operate independently of power outages, increasing communities' resilience in emergencies and natural disasters. The energy generated by human movement on a bicycle uses a local and renewable resource, which can be especially beneficial in remote or developing areas where access to electricity is limited

or non-existent. Although the initial investment in installing these systems can be significant, in the long term, they can generate substantial savings in operating costs and reduce economic losses associated with power outages. Using a bicycle as a power source promotes healthy and active lifestyles by encouraging physical activity among users, which can have additional benefits for the health and well-being of the community.[12]

CONCLUSIONS

It highlights the need for policies and programs that promote the adoption of self-sustaining energy and address the barriers identified. Successfully implementing these technologies could improve energy resilience and enhance quality of life.

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CONFLICT OF INTEREST

The authors declare that there is no conflict of interest.

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