

Clean Energies: An Opportunity to save the Planet¹

Energías Limpias una Oportunidad para salvar el Planeta

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Abstract-- Clean energies, also known as renewable energies, can be produced with minimum social, cultural, health, and environmental impacts. The aim of this study is to design an electric generator powered by pedaling a bicycle to charge small electronic devices through a USB port, as an alternative to reduce conventional energy consumption at homes in San Sebastián. The study is qualitative, descriptive in scope and was applied to (30) students of the San Sebastián School. The main conclusion is that the students have managed to raise awareness in the community of San Sebastián on the use of alternative energies through their participation in events such as fairs, as an active way to help reduce pollution and to combat climate change on the planet.

Keywords-- Clean Energy; renewable energies, Environment, social prejudices.

Resumen-- Las energías limpias, también conocida como energías renovables pueden producirse con un mínimo de perjuicios sociales, culturales, para la salud y el medio ambiente. Por lo tanto, el presente artículo busca diseñar un generador eléctrico utilizando el pedaleo en una bicicleta para cargar a través de puerto USB equipos electrónicos pequeños, como una propuesta alternativa para la disminución del consumo energético convencional en los hogares de San Sebastián. La investigación es de corte cualitativo, de alcance descriptivo y fue aplicada a (30) estudiantes de la IED Externado de San Sebastián. Como conclusiones se puede inferir que los estudiantes han logrado a través de su participación en eventos como las ferias dar a conocer a la comunidad san Sebastiánera el uso de energías alternativas dado que son una forma activa de colaborar en disminuir la contaminación y de combatir el cambio climático en el planeta.

Palabras clave-- Energía Limpias; energías renovables, Medio Ambiente, prejuicios sociales.

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I. Introduction

The project “Clean Energies, an Opportunity to Save the Planet” is aimed at addressing the current issue of global warming, which affects the ecosystems we have in San Sebastián, Ciénaga de Carrillo, which is the windiest area, and the desire of making a positive and effective contribution to solving the problem, not only for the community of Sebastián, but also as a model that can be used elsewhere in the world, given that global warming has extensive and irreversible global effects.

The purpose of this study is to design an electric generator powered by pedaling a bicycle to charge small electronic devices through a USB port, as an alternative to reduce conventional energy consumption at homes in San Sebastián.

A. Clean or renewable energies

Clean energies deserve special consideration, because they are produced with minimum negative social and cultural impacts, hand in hand with health and the environment. They are renewable sources that are generated primarily by the sun.

Renewable energies are “those that are produced continuously and are inexhaustible at a human scale; they are continuously renewed, unlike fossil fuels, of which only certain quantities or reserves exist and that are exhaustible over a more or less determinable term. The main forms of renewable energies are: biomass, hydraulic, wind, solar, geothermal and marine energies. Renewable energies are directly or indirectly derived from the energy from the Sun, with the exception of geothermal energy and energy from tides [1].”

There are currently encouraging percentages in terms of the contribution of renewable energies. For example, worldwide they account for 8% of the total and in Europe they account for 6%, which demonstrates a predominant use of hydraulic and biomass energy. There is also a high level of awareness on the world’s energy problem, due to industrialized nations’ dependence on fossil energy sources [1].

The use of clean energy undoubtedly proportionately reduces damages to ecosystems from fossil fuels and other devices that are highly contaminating and that do harm to humanity and the environment.

The use of clean energy produces numerous benefits, especially in rural areas, which offset certain disadvantages such as transformation costs and factors involving weather and atmospheric conditions, among others. A large seg-

ment of the population does not have access to this type of electricity for different reasons, including economic cost, but the current trend is increased availability because of its inexhaustible condition [3].

In Colombia, the problems that prevent the full development of the country are related to the operation of the economic system [2]. This justifies the implementation of new and innovative strategies supported by technology, such as alternative energy, hand in hand with sustainability.

According to Castillo [4], the term “clean energy” is still under development. However, he highlights that it refers to energy that produces lower environmental impacts during use and in the construction of the infrastructure required to use it than conventional energies, hydrocarbons and large hydroelectric plants. This group of clean energies includes certain Non-Conventional Energy Sources (NCES).

The country is increasingly using different types of renewable energies. The most common example is hydroelectric power, which is a non-conventional energy source that accounts for a large percentage of the power transmitted through the national electric grid, complemented by energy produced from biomass and wind.

B. Small dams at waterfalls

In some places dams can be made to generate electricity from waterfalls or water currents, known as small and medium hydroelectric plants.

It should be mentioned that one of the most economical ways for producing electricity in places where there is sufficient water from rivers and streams is by means of hydroelectric power stations [3].

Renewable energy offers favorable conditions for satisfying future energy requirements. A clear example is the case of the radiation that reaches the earth, which is much more than the amount of energy required for life, as well as having an important impact on the ecosystems [8].

In terms of technical developments that enhance and improve the quality of life, many are suitable and timely, because they have been approved and put into practice in Colombia. Even though some non-renewable content is still present, more use of them should be made because of the way they save resources and the fact that they are sustainable.

This study intends to promote the use of renewable energy in the municipality of San Sebastián, Magdalena, by raising awareness in

Types of energy

Solar energy: “Solar energy requires the use of solar panels (photovoltaic) or solar cells to capture the sunlight and transform it into electricity. Since the sun does not always shine, the electricity that is produced must be stored in batteries before using it, in order to power lighting systems, motors and other machines. Installation of a solar energy system may be costly because it requires solar panels, batteries and other components. However, we get the sun rays for free” [5].

Wind energy: “Wind energy has been used for hundreds of years to pump water and to mill grains. More recently, wind is being used to generate electricity in Europe, North America, India, China, South Africa and Brazil. Larger-scale wind energy projects are often connected to the national electricity distribution network [5].” Wind energy is a renewable resource whose use has increased in recent years, which has also helped create jobs, due to its primary characteristic of being clean and sustainable.

Biomass energy: In many countries, biomass (plant and animal waste products) “is a common source of energy. Energy from biomass materials can be released by means of combustion, or by allowing it to rot to produce biogas (a type of natural gas) (González, 2011). Biomass from plants is renewable, but when it is burned as fuel is contributes to climate change and causes health problems” [6].

Biogas: “It is produced when organic matter rots. Biogas can be produced from different types of organic materials: Manure and urine from animals, human excrements, food wastes (meat, blood, bones and vegetable wastes), materials from plants such as wastes from harvests, straw, leaves, tree trunks, branches and cut grass”[7].

Source: Authors.

the community in general on how the implementation of natural resources is favorable and increases the quality of life, while helping to preserve the environment, in addition to its social, cultural and regional benefits [4].

C. Power-generating bicycle

[3]. “One of the least used renewable energies available today for transformation into electric energy is that generated by the human being. Humans use food and breathing to produce energy and perform work with it. It is possible to make use of the energy produced when we perform recreational and sports activities, such as bicycling. With the assistance of the bicycle, part of the energy we use to get from one place to another could be stored as electric energy [9]”.

The bicycle is considered one of the best inventions, because it is a means of transportation that enables us to travel to different places, propelled by human energy. The generation of energy from pedaling is an innovative tool that can also be used to charge devices that require electricity.

IV. Methodology

This study takes a Qualitative approach [10], which studies reality in its original context, to find the nature of the reality associated with its behavior and manifestations. Also, in its dynamic dimension, it aims to fulfill the two basic tasks of all research: to collect data and categorize and interpret them. Given the type of qualitative research and the characteristics of the research scenario, the data collection technique selected was the interview. Consequently, the information was recorded in a structured interview instrument, and the data was later systematized, analyzed and interpreted [11].

The scenario for study performance is the San Sebastián School, and the participants are thirty (30) students who took the structured survey.

The study was carried out in the following stages:

Stage (1): Selection of the instruments to be used

Stage (2): Specification of the categories for study

Stage (3): Selection of the data collection instruments

Stage (4): Based on the categories of the study: Clean energy and the environment, the participants were interviewed, aimed at describing the phenomenon studied based on the type of research (non-experimental), where the phenomenon is observed and analyzed as it actually occurs.

The questions were designed with advice and validation by expert judges, based on which the questionnaire was designed, and the interview was performed with the students of the San Sebastián School for the specific purposes of the study.

Stage (5): Once the results of the structured interview were obtained and the observations had been recorded, the results were interpreted in light of the theory that supports the research.

Stage (6): The results and findings are presented.

V. Results

The following are the results obtained from the instruments that were used, taking into consideration the leading question: How can alternative energies be implemented in the municipality of San Sebastián to reduce the use of energies that are harmful for the environment?

Study category	Leading question	Participant views	Articulation with theory and systematization
Clean energies	Do you know the different sources of energy?	<p>“Solar, air, hydraulic, wind, tide movement, biomass “Wind, Kinetic, aerostatic”</p> <p>“Electric, nuclear”; “Anaerobic, Thermal”; “Mining, moon”; “Biomass”; “Potential”.</p>	<p>Based on the interview results, it is deduced that the students are aware of the following energy sources: solar, air, hydraulic, wind, kinetic, aerostatic, nuclear, thermal, biomass, potential. In general, the interviewed students said they are aware of the different types of energy available. In this regard [6], the following are some of the simplest forms of energy: mechanical energy, thermal energy, chemical energy, luminous energy, sound energy, electric energy, nuclear energy, among others. Based on the above, we find that the interview results regarding students’ responses on different types of energy are aligned with what is stated by the quoted author.</p>
Clean energies	What are the advantages and disadvantages of the types of energy we use?	<p>“We can turn on our devices that need electricity, such as the cell phone, air conditioning, refrigerator. Disadvantage: we damage the environment by affecting ecosystems by the consumption of water to generate electricity”; “Sometimes there are advantages and disadvantages, the advantage is that sometimes it is too hot and humid so you need a fan or something else, and the disadvantage is that it can be very dangerous both for us and for babies”.</p>	<p>The interview responses are aligned with what is mentioned by [9], who says that the benefits and disadvantages of the energy used have to do with its environmental effects, because clearly all energy sources on the planet offer advantages and disadvantages [9].</p>
Environmental protection	In what way do you believe that using electric energy deteriorates the environment?	<p>“Electricity heats up the environment. Electric energy needs water, and when there are shortages it affects nature”; “It causes global warming and the dams cause harm to the environment”; “It produces high costs that cannot be recovered”; “Since energy is produced from water, the water we use dries up the rivers and lakes”; “Since the water is held in storage, it is not allowed to flow”; “producing electric energy harms the environment”; “Production of electric energy deteriorates the environment, the air and the vegetation cover of the planet”; “Installation of sources of electric energy causes environmental damage”; “Because of the massive use of energy”; “The carbon dioxide produced by automobiles and factories pollute the atmosphere”.</p>	<p>The answers given by the students at the school reaffirm that the use of electric energy has disadvantages [11], by saying that even though it is clean and available in nature, it depends on weather conditions, it affects soil quality, it affects ecosystems, increases water flow levels and affects aquatic species.</p>
Environmental protection	What strategies can you use to improve the environment in the municipality of San Sebastián?	<p>“Invest in the environment; avoid bonfires”; “Recycling”; “Control plastics”; “Making protests with the children”; “Involving the community in street cleaning activities”; “With reforestation projects, because the trees produce oxygen”</p>	<p>The students recognize that strategies must be implemented to rationalize the use of energy in order to mitigate the effects of mass usage of electric energy. They highlight the need to find new possible sources of energy that are environmentally friendly so as to ensure the preservation of life on the planet. The students’ views are consistent with what is described by Iberdrola (a Spanish company based in the town of Vizcaína in Bilbao, in País Vasco, Spain, that produces, distributes and commercializes energy), regarding the minimization of the environmental consequences of electric energy generation and distribution by implementing control and monitoring measures.</p>

Source: Authors.

VI. Conclusions

- The students are aware of the importance of informing the community of the municipality of San Sebastián about the different forms of alternative energy in order to reduce harmful effects on the environment.
- The students believe that the benefits of the different types of alternative energy include not using fuels, not producing polluting wastes, they are derived from an inexhaustible source of energy, and do not require much maintenance.
- The school's students believe that making use of alternative energy sources, including solar, wind and hydraulic energy, which have been available since ancient times and which have increased at a fast pace to address environmental problems from over-use, opens the door to new possibilities for renewable energies.

Lastly, the school's students have become advocates of new ideas in the field of energy upon realizing that renewable energies are an important possibility because they are favorable for the environment, with greater security and diversity of supply. Their main characteristic is that they are clean, inexhaustible and increasingly competitive. The growth of clean energies is unstoppable. They have also managed to display the use of alternative energies to the community of San Sebastián through events such as fairs, because they are a participative way to reduce pollution and to overcome climate change in the planet. They allow rural communities to have access to services such as gas, electricity, water and fuel [12].

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