“TechnoPark"
Proposal for a self-sustainable park and producer of electric energy

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Summary

We are constantly fighting against climate change and looking for new ways to care for our environment and make it more sustainable. A very important step is the use of renewable energies to traditional energies, which damage the environment through the waste they generate. Renewable energies come from inexhaustible natural resources. We will always have water, wind or sun with which to produce energy, in addition to the fact that we have the capacity to transform mechanical energy into electrical energy. That is why the development of self-sustaining facilities has become a reality and our self-sustaining ecological park is a sign of it.

Research question

How can mechanisms be adapted to conventional games to generate and store energy through the movement of children, as well as to use renewable and clean energy?

Objetive

Construir un parque que sea sustentable aprovechando la energía de los niños para generar y almacenar energía eléctrica mediante la adaptación de mecanismos generadores en algunos de los juegos convencionales que se pueden encontrar en los parques, como por ejemplo columpios, sube y baja, carruseles y demás juegos giratorios, además de la implementación de paneles solares y generadores eólicos, además de dispositivos para la captación de agua de lluvia.
Se espera generar suficiente energía eléctrica para generar un ahorro en el gasto de electricidad de los municipios o alcaldías donde se puedan implementar estos parques.

Justification

The generation of clean and sustainable energy is an urgent short-term goal for human beings. Today, pollution is something we face all over the world and much of this pollution is generated by the fossil fuels that are used to produce electrical energy.
The kinetic energy of a body is that energy it possesses due to its movement. Storing kinetic energy is the most appropriate way to harness the energy we generate. That is why, a park that generates and stores this type of energy through the movement of conventional games (swing, carousels, rotating games, up and down, etc.), solar panels and wind devices, will be self-sustaining and environmentally friendly.
Parks are a source of energy that is generally wasted since about 150 people visit them a day of which approximately 75% are children, who use the games inside the parks. The energy generated from all this movement can be used to produce energy and thus feed the electricity sources of the park, becoming a self-sustaining park and producer of electricity and drinking water.

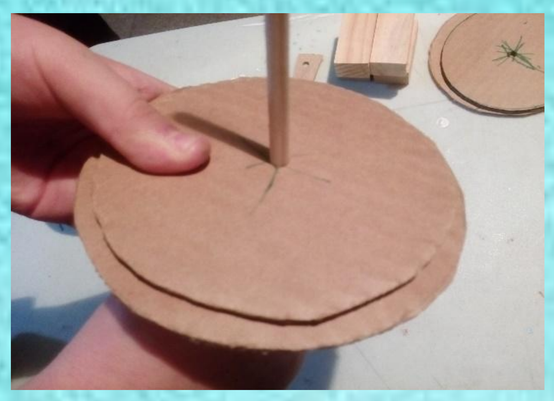
Hypothesis

If we manage to adapt mechanisms to conventional games to generate and store energy, then we will be able to build a self-sustaining and environmentally friendly park that generates enough electrical energy to be self-sustaining and provide electricity to some of the lights in the community where it is located.

Problem statement

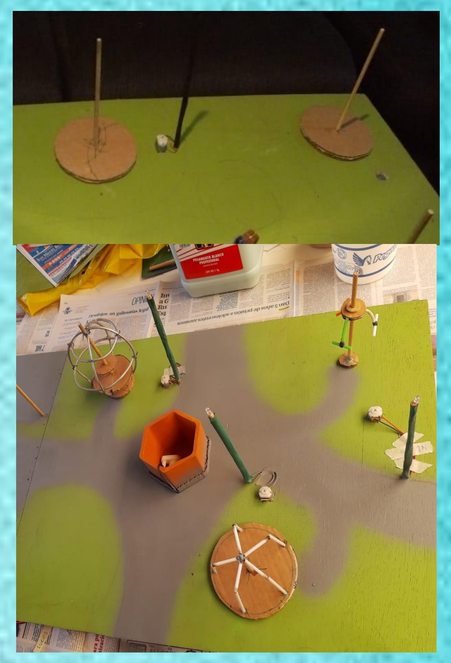
Currently, energy waste is a problem that has caused both economic and environmental shortages, since much of the energy we generate is not used. A lot of money is invested in the production of electrical energy and the environment is also polluted during this process.
Transforming kinetic energy and electrical energy is not the most efficient way to generate electricity, but it is one of the most appropriate ways to use all the energy we generate. The pollution of the environment is another great problem that society faces and a great part of this is caused by the fossil fuels used in the production of electrical energy. In addition, the main sources of energy are highly polluting, an example of which are the thermoelectric power stations which, due to the burning of fuels, generate CO2 emissions causing atmospheric pollution that results in a global greenhouse effect. On the other hand, nuclear power plants produce highly contaminating radioactive waste. Combined cycles produce combustion, exploitation of deposits, water and soil pollution, as well as biomass energy.

1. Materials

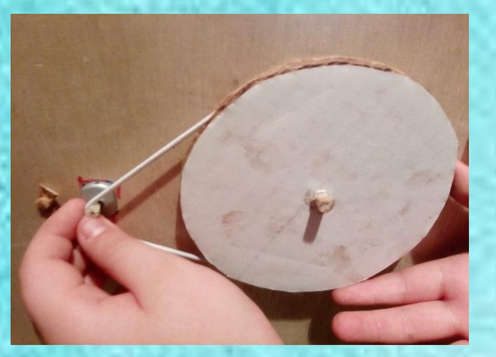


2. Make cardboard disks and pierce them through the center with a wooden stick.

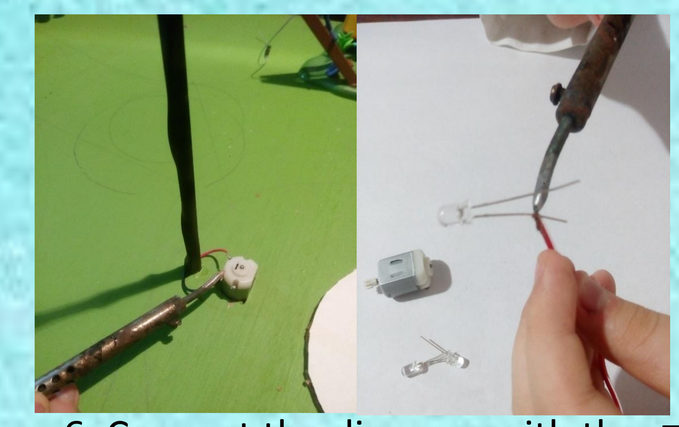
3. Make replicas of the rotating games found in parks.



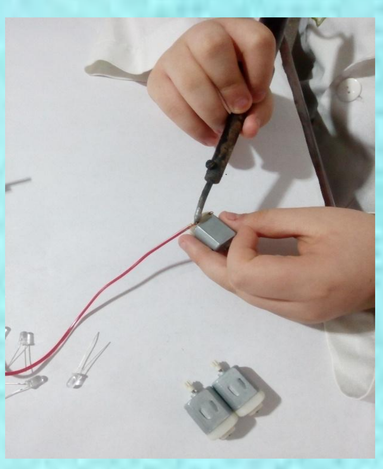
4. Place the replicas of the sets over the holes in the wood.



5. Connect the dinamos to the circles with a rubber band under the wooden board.

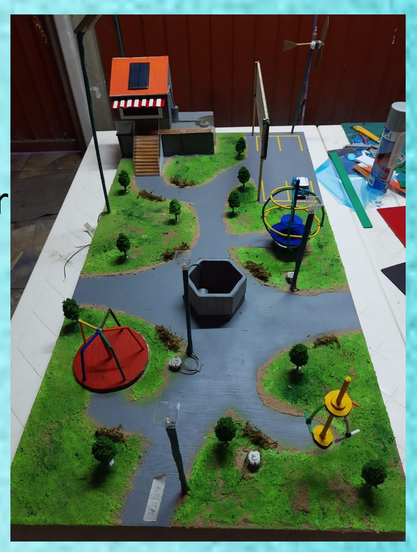


6. Connect the dinamos with the led lights.



7. Make the electrical connections underneath the model.

8. Make a model of the tent and place the solar panels.



12. Give finishing touches and aesthetics.

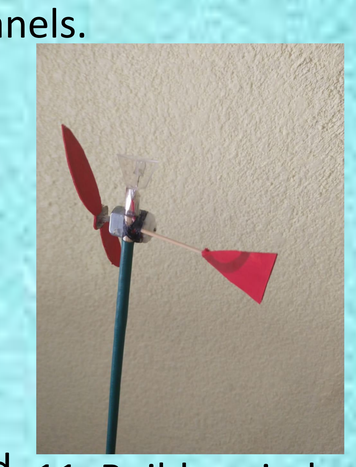
Results

We managed to build a model of self-sustaining park and electric energy generator and storage.

Results

9. Build a rainwater collection system.

10. Build the fountain and place the bomb inside it.



11. Build a wind generator.

Conclusions

Developing this project allowed us to realize that it is possible to develop sustainable and environmentally friendly construction models.

In addition, we reached some of the following technical and economic conclusions:

The municipality of Coacalco consumes 2,144.3 kW/h distributed in 11,286 public lights which gives us an average consumption of 190 W per light, 2280 Wh/day or 2.28 kWh/day. The CFE charges the municipalities a rate of 4,297 $/kWh, if the lights work 12 hours a day on average, the charge is 4,297 $/kWh x 12 hours = 51,564 $/kWh per day, if each light consumes 2.28 kWh/day it represents an expense of 51,564 $/kWh/day x 2.28 kWh/day = $117.5 and per month it represents $3,527.

According to the configuration that we propose for this park, we have an electricity generation per device in the following way:

1 wind turbine = 8 kWh/day

4 solar panels = 5 kWh/day

3 mechanical sets = 11.25 kWh/day

Total energy generated = 24.25 kWh/day

According to our calculations, a park with the characteristics that we present can feed approximately 45 LED technology lights, if these 45 conventional lights are replaced with LED technology and these same lights are fed with the clean and sustainable energy of our proposal would imply the following savings:

45 lights X $3,527= $158,715 per month

Discussion

It was possible to develop a model for the construction of self-sustaining parks where it was observed that it is possible to take advantage of rainwater and clean and renewable energies such as solar and wind energy, in addition to transforming mechanical energy into electrical energy to store and use it in different ways contributing to the improvement of the environment and also saving money and natural resources

Bibliography

Diego Perez. (2016). Cuántos paneles solares necesitas según tu recibo de CFE. 23/12/2019, de Propiedades.com blog Sitio web: http://propiedades.com/blog/arquitecura-y-urbanismo/cuantos-paneles-solares-necesitas-segun-tu-recibo-de-cfe

Ricardo Estévez. (2013). Energías renovables en tu casa (V): eólica.12/12/2019, de Eco inteligencia Sitio web: https://www.ecointeligencia.com/2013/04/energias-renovables-en-casa-eolica/

(2018). Energías renovables: características, tipos y nuevos retos.23/12/2019, de Factorenergia Sitioweb:https://www.factorenergia.com/es/blog/noticias/energias-renovables-caracteristicas-tipos-nuevos-retos