CALIFORNIA STATE SCIENCE FAIR
2012 PROJECT SUMMARY

Name(s)
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Project Number
S0324

Project Title
An Analysis of Energy Output by Water Turbines Due to Excessive Rainfall in a Third World Country

Abstract

Objectives/Goals
My objective for this science project was to determine the potential energy output from turning water turbines in a Third World country location with a greater than average amount of rainfall. After determining this, my goal was to provide enough energy to keep a 25-watt light bulb on for 8 hours at night.

Methods/Materials
In the initial experiment, I constructed two systems of water turbines made of metal blades stapled to wood stick shafts. The turbines were placed in gutters about 90 centimeters long with channels that narrowed the flow of water. In the first system, a Pelton wheel style turbine was fastened on the top of the gutter with PVC pipe rings on both sides of the shaft. The second system had a water wheel style turbine in a hole on the bottom of the gutter with a PVC pipe ring. To calculate the electrical output, alligator clips connected a dynamo to a multimeter were used to measure the voltage and amps and their production as wattage.
I calculated the quantity of water that would fall off a roof of a typical house. For the initial experiment, water was poured down horizontally and vertically into the gutters at the rate of 1 liter per minute for 30 seconds. In the modified experiment, two water turbines were removed from the gutters and placed directly under the bathroom sink faucet, with water released onto the turbine blades for 30 seconds.

Results
During the initial experiment, an insufficient water flow and force did not turn the water turbines in the gutters to get data. For the horizontal design, water went down the water channel straight, but the force of water could not push the water turbines. For the vertical design, the speed and path of water flow was hindered because water crawled along the metal of the water channel.
To get an energy reading directly from the turning turbines, I modified the initial experiment. The turbine from the first system produced an average of 0.0000356 watts per 30 seconds and the second system produced an average of 0.0000535 watts per 30 seconds.

Conclusions/Discussion
Therefore, the systems could not provide enough energy to light a 25-watt bulb. However, with changes and improvements it could be developed into a small, inexpensive energy source in Third World countries that have heavy annual rainfall. For example, this system could be adapted into a micro-mini dam attached to a house and its gutter system.

Summary Statement
My research project analyzed the flow of excessive rainfall in Third World countries that would be needed to turn turbines to generate electricity.

Help Received
A professor and two students at CSU,Chico helped with mechanical concepts; My science teacher helped getting materials and brainstorming