



CALIFORNIA STATE SCIENCE FAIR 2011 PROJECT SUMMARY

Name(s) <p style="text-align: center;">Olivia E. Wong</p>	Project Number <div style="text-align: right; padding-right: 10px;">31553</div>
Project Title <p style="text-align: center;">Harnessing the Green Energy from Oceanic Perpetual Waves</p>	
<div style="display: flex; justify-content: space-between;"> <div style="width: 45%;"> Objectives/Goals <p>The objective of this project is to create an easily manufactured solenoid generator system in order to generate clean-renewable energy with the propagation of ocean waves with the application of Lenz's Law.</p> </div> <div style="width: 45%;"> Abstract <p>The objective of this project is to create an easily manufactured solenoid generator system in order to generate clean-renewable energy with the propagation of ocean waves with the application of Lenz's Law.</p> </div> </div>	
Methods/Materials <p>Magwires were wound onto a non-conducting plexi tube in three different sections, equally separated by spacers. Two wires were soldered onto each solenoid respectively and brought out to a test point. Place the magnets in a plexi tubes with spacers in the following configurations with opposite polarities: north/south, south/north. Two methods were used to test the efficiency of the solenoid generator: free-fall and using Hooke's spring constant. A buoyancy-regulated platform was created out of PVC and ABS pipes and connectors. An ABS cross fixture contained the solenoid generator. The oscilloscope probes were attached to the test points of the solenoid generator. By dropping the magnetic rod through the center of the solenoid generator, alternating current voltage was observed with the sinusoidal graphs.</p>	
Results <p>The mean power generated by the five magnets is 1.06 Watts in 250 milliseconds. The strength of the magnets was relatively weak and also the gauge of the coils was thin. There are ten peaks, five crests and five troughs. By analyzing each crest and trough, the minimum power measured in Watts is 0.26, the mean is 1.06 Watts, and the maximum is 1.47.</p>	
Conclusions/Discussion <p>The designed system of the tethers, solenoid generators, solar panel impregnated dome, and buoys provide an ecologically beneficial system, which will have minimal to no impact on aquatic life. In order to protect the solenoid generator from being affected by the ocean waves, a dome impregnated with solar panels will dissipate the rough ocean waves. Moreover, wind turbines may be integrated into the platform instead of the using tethers. The action-reaction principle will be dependent on the platform of the systems. Gear-like systems may be implemented to adjust the height of the system based on the solar interactions to maximize production. Implementing Faraday's Cage among the multiple solenoid generators will prevent electromagnetic interference between the solenoid generators.</p>	
Summary Statement <p>Using Faraday's Law of Electromagnetic Induction and Lenz's Law, the creation of this solenoid generator will convert the unutilized potential green energy of ocean waves to electrical power.</p>	
Help Received <p>My mother helped me with the visual display. My physics teacher, Mr. Lee, provided me with advice, support and taught me the various theories. Lastly, my adviser, James Khoo, helped me construct the solenoid generator and visual displays.</p>	