2009
MASSACHUSETTS CLEAN TECHNOLOGY AWARDS

A Program from The Foresight Project Inc; www.theforesightproject.org

Region V, Southeastern MA CleanTech Award:

Nick Aylward, Sacred Heart High School, Kingston

"Wave Power"

ABOUT ME:

My name is Nick Aylward, and I am a sophomore at Sacred Heart High School in Kingston. I live in Plymouth and went to Cold Springs Elementary school and then to PCIS before starting at Sacred Heart. In school I enjoy science and history. Outside of school I enjoy hiking, snowboarding, reading, video games, and anything to do with aviation. I run cross country and track for my school. I am split between wanting to go into either the engineering field or the medical field after college. In 8th grade I made it to the regional science fair and then on to state with a project about two of the main gas laws, Charles law and Boyle's law. The science fair, for me, is an enriching experience, and a lot of credit has to go to my Mom and Dad and my school for all their support.

MY PROJECT:

This project is meant to show that it is possible to use Faraday's law of induction (which says that "the induced electromotive force or EMF in any closed circuit is equal to the time rate of change of the magnetic flux through the circuit", in other words, moving a magnet through a loop of wire will make electrons flow because electrons react to a magnetic field, and will continue to flow in a changing magnetic field) to convert the energy in waves into useable, storable energy. In the attempt of doing this it was shown that it is not only possible, but is possible to do it with regular household items (other than the Neodymium magnets).

I proceeded by building a point absorber (a wave generator where one component moves in relationship to another) wave power generator. This generator was mounted on a raft made from recycled scrap wood and foam insulation. The generator itself was made from PVC piping and 34 gage magnetic wire wound in a coil. Mounted between these two components were 24 neodymium magnets on a movable bar. Waves in the ocean would cause the bar to move up and down, moving the magnets through the coil. If the magnets are moving, they exert a force on the charges (electrons) in the copper wire which can then be used for power: the kinetic energy of the magnets is used to create electrical energy.

Because wave motion is not uniform, the copper wire was soldered to a bridge rectifier to change the voltage to DC from AC with a Capacitor to smooth out the wave into close to a sine wave. The setup was tested to see if it did generate electricity by attaching a solar powered garden light. This garden light would remain dark during the day time if it were not receiving energy from a source other than its solar panel because it has a sensor that tells it if it is light or dark out. So if it lit up it would be possible to tell if energy was coming from the wave generator.

During the test it was apparent that the wave generator was generating electricity because the LED lit up as the magnets moved through the coil.

From this demonstration it can be concluded that it is possible to use Faraday's law of induction to convert the energy in waves into useable, storable energy. This could be used to generate electricity in anything that experiences motion but most importantly it shows that wave power is just as viable an energy source as solar or wind power.