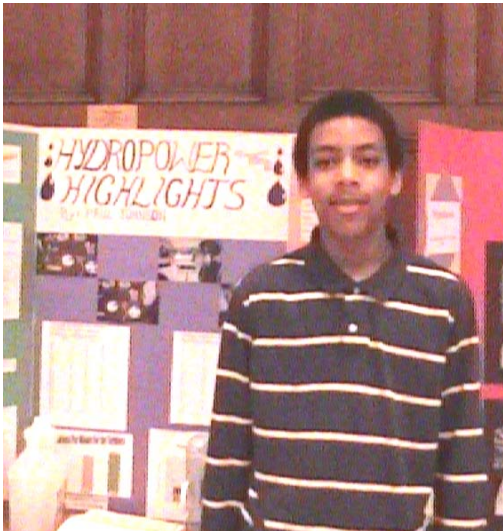




## IMAGINING TOMORROW: ALTERNATE ENERGY FUTURES

Presented by The Northeast Sustainable Energy Association



### Clean Energy Award - Middle School Region II: Central MA

Paul Johnson,  
Bancroft School, Worcester, MA

*"The Effect of the Number of Blades  
on the Amount of Voltage Produced  
by a Water Turbine"*

Paul lives with his mother, father and pet rabbit, and has a nineteen-year-old sister who is a junior at Skidmore College. He is in the seventh grade at Bancroft School in Worcester, MA and his favorite subjects are math and science. Paul is also interested in *Star Trek* and Lego Robotics, and he has joined the First Lego League at Bancroft School.

Paul became interested in this project when he was searching for projects dealing with hydroelectricity. Paul was fascinated by the idea of building his own generator that would produce measurable amounts of electricity using only hydropower.

**THE PROJECT:** The purpose of this experiment was to build a water turbine and generator that produced the most voltage. The main idea was to create the most electricity in the cleanest manner, and a water turbine generates electricity without polluting the environment.

**ABSTRACT:** A water turbine and generator were built, using an adapted version of the steps for building your own hydroelectric generator from the website [www.re-energy.ca](http://www.re-energy.ca). The generator uses magnets and a magnetic field to move the electrons through the wire. The magnets are attached to a disk that spins around the wire. Moving water is the energy that rotates the disk. Increasing the number of blades attached to the turbine was expected to increase the amount of voltage produced because the magnets would make more rotations around the wire. Initially, the amount of voltage was difficult to measure using a simple voltmeter. An oscilloscope was used to measure the amount of voltage produced because this type of generator created alternating current, which means that the electrons are moving in both directions. The voltmeter could not read this type of voltage.

The final result was that the rotor with twelve blades did generate the most voltage. The rotor with the twelve blades produced an average of 0.025 volts compared to an average of 0.017 volts for the eight-blade rotor and an average of 0.01 volts for the four-blade rotor.