

CALIFORNIA STATE SCIENCE FAIR 2014 PROJECT SUMMARY

Name(s) **Project Number** Max A. Freedman 34161

Project Title

Power from Ocean Waves

Objectives/Goals

Can ocean wave power be used generate electricity? Oceans have tremendous botent it, but ocean energy is not widely used. Wave energy, from tides and ocean currents can be used to drive an Oscillating Water Column (OWC). This project builds a small scale OWC using a Wells turbine apparatus, to generate energy with ocean waves.

Abstract

Methods/Materials

Methods: Prototype, test and refine systems and integrate systems into working OWC. Pipe System (Pneumatic): Task: Convert wave energy to pneumatic energy. Action: When waves ascend, air pushes out and when waves descend, air is pulled in. Turbine System (Mechanica): Task: Convert pneumatic to mechanical energy Action: Moving air spins turbine and turns the motor Electrical System (Electrical): Task Convert mechanical energy to electrical energy Action. Electricity is generated by spinning motor and conducted to voltmeter. Integrated System (Wave Pneumatic, Michanical, Electrical): Task: Convert wave energy to pneumatic energy to mechanical energy to electrical energy Action Integrate all systems using waves to spin the turbine generating electricity

Materials: 4# diameter 3D printed PVC Wells turnine and assembly, 2v DC motor with bell wires, ABS 4# pipe and fittings, 50 gal plastic garbage can

Individual systems were prototyped tested and refined Pheamatic System--Air Pressure Test: Is there enough air pressure to spin the turbine? Sybmerge in ocean waves, test the air pressure coming off the OWC in three trials using a weighted lid. The air pressure generated from the OWC was: 86.59 kPa. Turbine System--Intake vs. Outake Test: Is the Wells Turbine effectively producing electricity in both directions? Testing the turbine with the blover, the htake air direction generated higher voltages, however both directions produced voltage. Electrical System--Resistor Test: What is the power potential in the system? Testing the motor with 10k ohro, 1k ohm, 100 ohm resistors demonstrate the power generated by motor, 1.85, 20.16, 1444 respectively. Integrated System--Integrated Systems Test: Will It Work? Integrating all systems aid not generate electricity with ocean waves.

Conclusions/Discussion

This engineering project demonstrates a small-scale model of OWC and Wells turbine. Initial results from the integrated unit fan to generate electricity.

Summary Statement

ect demonstrates a small-scale model of OWC and Wells turbine to generate This engineering pro electricity from ocean waves.

Help Received

My mom helped me with research and board. My dad helped me assemble my model and testing in the ocean