



SOCIETY OF PHYSICS STUDENTS

An organization of the American Institute of Physics

Marsh White Award Report Template

Project Proposal Title	Renewable Energy In Units Anyone Can Understand
Name of School	Hamline University
SPS Chapter Number	2641
Project Lead (name then email address)	Matthew Choquette Mchoquette01@hamline.edu
Total Amount Received from SPS	\$250.00
Total Amount Expended from SPS	\$500.00

Summary of Award Activities

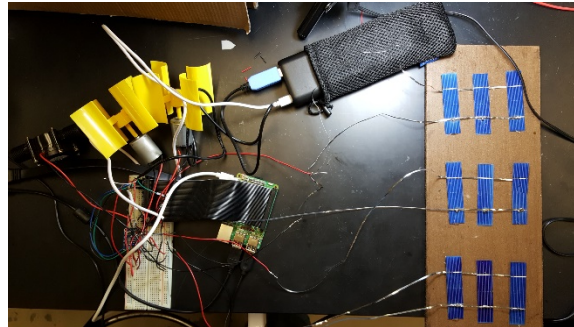
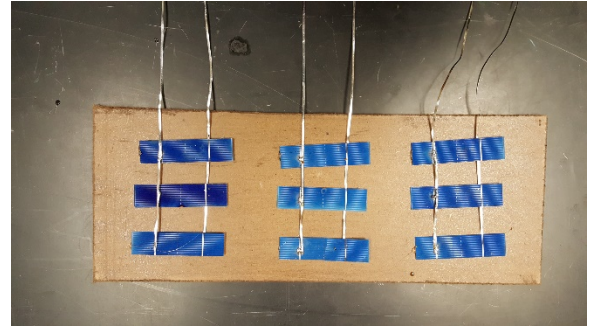
Our goal at Hamline University is to develop youth understanding of the current efficiency of renewable energy and how much better it can be. We are motivated by the importance of innovations in this field, as well as the necessity of getting young students to think about sustainability.

Statement of Activity

Overview of Award Activity

The purpose of this project is to construct a small model house, which is powered by wind, solar and hydroelectric energy. The model will then be used for outreach at local K-12 schools and the Hamline University community. Along with the house, there is a screen displaying a Python program running on a Raspberry Pi which displays how much voltage is produced, in total and by each of the three renewable energy sources. This project has the goal of introducing students to renewable energy in terms and numbers they can easily understand.

Currently, the exterior of the house has been constructed, and all renewable energy sources have been wired to the battery. All that remains before conducting outreach events is to assemble the circuitry inside the house and affix it to a wooden base. Once the base is constructed, a well will be cut through and outlined with clear acrylic sheeting to simulate a river passing by the house. This will then be filled with water, and the water pump and hydroelectric generator will be placed there.



Clockwise from top left: Exterior of the model house; Solar panels fixed to one of the two roof panels with bus wire to attach to a breadboard; Circuitry setup with one roof panel, wind turbines, hydroelectric generators, battery and Raspberry Pi.

Since there is very little left to be completed on the construction of the model itself, assembly will be finished by the end of January. At that point, contacts can be made to arrange outreach events, which will occur throughout the spring semester.

We plan to conduct outreach initially at Hamline Elementary school. Hamline University and Hamline Elementary have a long-standing relationship of college students working with younger students. For younger audiences, the presentation will include an overview of why renewable energy sources are important, and how each reacts to a different input (i.e. how the solar panel outputs more voltage when exposed to more light). The model will also be brought to the high schools of the SPS Chapter President and Vice President. For high schools, the content of the presentation will be modified to be better suited for an older audience. Technical details about how the renewable energy systems and the computer program works will be included. We will also hold an event with the model on Hamline University's campus, to promote our SPS Chapter. Hamline operates the Renewable Energy and Environmental Research Laboratory, and this project fits well with the lab's mission.

Expenditures

All materials purchased have fallen within our original \$500 goal. Duplicates of some parts were bought to be replacements, ensuring the model can be used for years to come. We will require no new materials to complete the project.

Expenditure Table

Item	Please explain how this expense relates to your project as outlined in your proposal.	Cost
Raspberry Pi Model B+	Runs the program which displays data on how much voltage is produced	70.00
Small solar cells (Pack of 50, quantity 2)	Collects solar energy	18.00
Small wind turbines (Quantity 4)	Collects wind energy	30.00
Small hydroelectric generators (Quantity 7)	Collects hydroelectric energy	84.00
Analog to digital converter (Quantity 4)	Necessary to convert signals from the above 3 sources to digital so they can be used as input to the battery	56.00
20000 mAh Battery (Quantity 2)	The battery charges from the electricity not used by the Raspberry Pi	80.00
7" USB powered screen	Interface for displaying program with voltage production data	59.00
USB water pump	Creates a stream of water to spin the hydroelectric generator	8.00
Fluorescent lamp	Additional stimulus for the solar cells	20.00
USB powered fan	Stimulus for the wind turbines	15.00
Wood and other building supplies	Used to build the base and house	60.00
Total of Expenses		500.00



If you have any questions, please contact the SPS National Office Staff
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