



# CALIFORNIA SCIENCE & ENGINEERING FAIR 2019 PROJECT SUMMARY

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| <b>Name(s)</b><br><b>Caroline Schmidt; Scarlett Streitman</b>   | <b>Project Number</b><br><b>J0214</b> |
| <b>Project Title</b><br><b>WAVE Goodbye to Fossil Fuels: It's Time to SEA Energy Differently!</b>   |                                       |
| <p style="text-align: center;"><b>Abstract</b></p> <p><b>Objectives</b><br/>Our goal was to create a self-sustaining energy source that relied on natural occurrences. We decided to make a wave powered generator, after researching several alternative energy sources. We strived to use recycled materials in a purposeful manner in order to reduce non-biodegradable waste in the ocean. Based on research, we believed that the amount of energy would increase as the waves grew in size and speed, due to the magnet s larger and faster movements. Today, fossil fuels are used for energy because of their convenience. Due to using greater quantities of fossil fuels, changes have occurred in the environment; the solution could be wave energy.</p> <p><b>Methods</b><br/>We created a generator using a plastic bottle, copper wire, magnets, and electrical tape. We recorded 100 results with 17 varying wave heights, and 29 varying outcomes. The wave heights varied from 3 to 23 cm. Before testing, we assembled the generator by using the water container as a buoy. We attached the magnets, and wrapped a water bottle in copper wire. While testing, the waves carried the buoy to different heights, resulting in varying amounts of energy being produced.</p> <p><b>Results</b><br/>After recording 100 results, we calculated the mean, median, mode, and range of the data. After several days of testing, there was an outlier of 14.1 V, which we did not include into our calculations. The average amount of energy produced was 1.71 V and the average wave height was 11.05 cm. The median number of volts generated was 1.1 V, and the median wave height was 10 cm. The most common wave height was 8 cm, and the most common voltage was 0.9 V. Overall, the greatest amount of energy produced was 6.2 V, which occurred at 9 cm. The lowest recorded voltage was 0.4 V, which occurred at 3 cm, which was also the lowest wave height recorded.</p> <p><b>Conclusions</b><br/>In general, our hypothesis was supported. We documented that as the wave heights and speeds increased, the energy generated also increased. There were a few setbacks along the way, such as weather conditions. We would recommend performing more tests, in order to confirm the findings. The outcomes of the experiment seemed to reinforce the belief that wave energy could greatly improve how society produces electricity.</p> |                                       |
| <b>Summary Statement</b><br>In our project we constructed a wave-powered generator and correlated energy output to wave height.   |                                       |
| <b>Help Received</b><br>We would like to acknowledge our parents and our teacher for helping us obtain necessary materials.   |                                       |