



**CALIFORNIA SCIENCE & ENGINEERING FAIR  
2018 PROJECT SUMMARY**

<b>Name(s)</b> <b>Laura Gong</b>	<b>Project Number</b>  38547
<b>Project Title</b> <b>Optimal Multi-Renewable Energy Generator: Year 2</b>	
<p style="text-align: center;"><b>Abstract</b></p> <p><b>Objectives/Goals</b> The combustion of fossil fuels is the leading contributor to global warming. Reducing emissions of toxic elements by switching to renewable resources by harnessing energy from renewable sources is a necessary long-term solution. The first year goal was to analyze which areas along the coast of California and which specific weeks have the tallest ocean waves, producing more energy from a renewable source of ocean waves. This second-year goal is to create a physical energy generator that will harness energy from three renewable sources: ocean waves, winds, and the sun.</p> <p><b>Methods/Materials</b> Three methods are harnessing energy from the three renewable sources. A floating structure with the cylinder inside generates energy from the vertical motion of ocean waves. The rise and fall of wave height will trigger an electromagnetic induced current and generate electricity. A vertical axis wind turbine will be used to generate energy from the wind since it generates energy from all directions of the wind. Solar panels will be used to generate energy from radiant heat and light from the sun. Regression analysis with collected data will be used to find the correlation of possible factors including wind speed, ocean wave frequency, and temperature to the amount of electricity generated by wind power, ocean wave power, and solar power, respectively.</p> <p><b>Results</b> The overall station includes a floating structure with a tube perpendicular to it on the bottom. The wind turbine and solar panels will be located on top of the structure while the wave energy generator is located inside the cylindrical body. Wind speed and wave frequency have high linear correlations to amount of electricity generated.</p> <p><b>Conclusions/Discussion</b> This new energy station was successful to generate energy from three renewable energy sources and is a good starting point for a more permanent energy source solution.</p>	
<b>Summary Statement</b> I engineered a station that generates energy from three renewable energy sources- the sun, ocean waves, and winds.	
<b>Help Received</b> I designed and engineered the generator myself after taking multiple engineering courses in the past years. Mrs. Julie Munoz, my science research teacher, reviewed my research plan, abstract, and research paper.	