



**CALIFORNIA STATE SCIENCE FAIR  
2013 PROJECT SUMMARY**

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<b>Project Title</b> <b>Power of Density: A Catalyst for Hydroelectricity</b>	
<p style="text-align: center;"><b>Abstract</b></p> <p><b>Objectives/Goals</b> Last November, over 8 million people were left without electricity for weeks after Hurricane Sandy. Such natural calamities impact our country every year. Portable hydroelectric generators in residential areas will definitely improve such electricity crises. But what liquid would work best for the generator? The objective of the project is to determine the impact of the density of a liquid on the amount of electricity generated by a hydroelectric generator. Based on our study of hydroelectric power generation, we hypothesize that, higher the density of a liquid, greater the amount electricity that will be generated.</p> <p><b>Methods/Materials</b> We built a hydroelectric generator using a rotor, a stator and a turbine. For the rotor and stator, we cut a foam board into 2 circular disks. On the rotor disk, we marked the polarity of the magnets using a magnetic compass and hot glued the magnets, reversing the polarity each time. For the stator disk, we made 4 coils of magnetic wire, and hot glued them on the disk in different directions. For the turbine, we drilled a hole on the center of a cork and made seven slits on the cylindrical surface. We stuck seven spoons into the slits. Next, we drilled a hole in two opposite sides of a water can. We stuck the dowel through the holes and then attached the cork, stator, and rotor onto the dowel. With this, the hydroelectric generator was built. We poured the liquid from a fixed height onto the turbine. We recorded the volts generated using a multimeter. We repeated these steps with different liquids.</p> <p><b>Results</b> With higher density liquids, more electricity was generated. The density of salt water was 1.25 g/ml, sugar water was 1.2 g/ml, water was 1 g/ml, and Diet Coke was 0.997 g/ml. Salt water generated an average of 11 volts, water and sugar water generated an average of 10 volts and Diet coke generated 8.67 volts.</p> <p><b>Conclusions/Discussion</b> Our hypothesis was proved correct and was supported with the data collected by our experiment. We conclude that, the higher the density of the liquid, more electricity is generated. Although in our experiment, the difference in voltage was less between different liquids, the difference in power generation would be much higher when made on a larger scale.</p>	
<b>Summary Statement</b> This project demonstrates the impact of density on the amount of electricity generated by a hydroelectric generator.	
<b>Help Received</b> Our project sponsor was our mentor.	