



**CALIFORNIA STATE SCIENCE FAIR
2012 PROJECT SUMMARY**

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Project Title Polarized Power: The Study of a Rectenna Designed to Generate Electricity from a Common Television Signal	
<p style="text-align: center;">Abstract</p> <p>Objectives/Goals If a rectenna could be constructed to turn common television frequency signals into direct current then this type of unused energy could be a potential source of electricity.</p> <p>Methods/Materials The Antenna- The 1/2 inch copper pipe is cut into two, 9 and 3/4 inch pieces to be optimized for the entire UHF spectrum. Both pipe sections are inserted into the plastic junction box, forming a "T". The coaxial TV cable was cut to expose the internal copper conductor in the wire. A secondary cut was used to extract the metal grounding insulation. The copper conductor was soldered to one of the copper pipes and the metal grounding insulation was soldered to the other. The coaxial TV cable was inserted into a 5 and 1/2 foot piece of PVC pipe, to provide a stable handle for the Dipole antenna. The Rectifier- A plastic wafer circuit board was wired into a rectifier using capacitors and diodes. The rectifying components were then wired to the ground. The circuit input wire was soldered to the copper output wire of the dipole antenna. Optimizing the antenna- After selecting the strongest UHF television signal available (frequency 854-860 MHz), the antenna was optimized by cutting 3 inches off of each side. This optimization was based on the dipole formula that length in inches is equal to 498 divided by the frequency in MHz. The Rectenna- With the antenna wired to the rectifier, the device is now a functioning rectenna. The output of the rectenna was measured using a voltmeter. Charging a Battery- A DC battery charger was taken apart and it was wired to the rectenna's output. The device was monitored every two hours and the battery charge was checked with a battery tester.</p> <p>Results After 140 collective trials, a UHF television frequency of 854-860 MHz was used to generate 0.1 volts of electricity. The electricity from the rectenna was used to charge a 1.5 volts rechargeable battery over a 12 hour time period.</p> <p>Conclusions/Discussion Rectennas were designed to transform microwaves into direct current electricity. Since microwaves are just one form of RF energy rectennas may be able to generate electricity from other forms of RF energy. This experiment successfully demonstrated that a rectenna could be constructed to turn common television frequency signals into direct current.</p>	
Summary Statement The study of a Rectenna designed to generate electricity from a common television signal.	
Help Received	