



**CALIFORNIA STATE SCIENCE FAIR  
2012 PROJECT SUMMARY**

<b>Name(s)</b> <b>Dhuvarakesh Karthikeyan</b>	<b>Project Number</b> <b>J0209</b>
<b>Project Title</b> <b>Microbial Fuel Cells: A Feasible Source of Clean Energy, Water, and Waste Management</b>	
<p style="text-align: center;"><b>Abstract</b></p> <p><b>Objectives/Goals</b> My objective was to make a simple, cost-efficient, and effective microbial fuel cell that feeds on waste and produces electricity to address global problems such as: clean energy, sanitation, water, and waste-management. My goal in mind that I wished to achieve in this preliminary stage was a power production of 75mW, if any practicality in the future is to be met.</p> <p><b>Methods/Materials</b> I used cost-efficient and readily available equipment in order to create a two-chamber microbial fuel cell. I built the microbial fuel cell (MFC) by epoxying the proton exchange membrane (PEM) to the airtight anode and cathode reactors. After this, I installed the inoculum of benthic mud samples and the fuel of my simulation of municipal solid waste (MSW) and sewage waste. Next, I tested to see which resistor yielded the highest power production in the MFC and used that resistor throughout the duration of the experiment. I let the microbial fuel cell run for five days, taking voltage and amperage readings using a digital multimeter every 12 hours, at 6:00 AM and 6:00 PM.</p> <p><b>Results</b> The results recorded using the digital multimeter showed the microbial fuel cell produced averages for mW, mV, and mA of: 250.173 mW, 308.78 mV, and .73 mA, respectively.</p> <p><b>Conclusions/Discussion</b> My conclusion is that the complex organic compounds in waste can be broken down to release meaningful amounts of electrical energy through the incorporation of a microbial fuel cell. This is shown through the actual MFC producing over 3 times as much power, 2 times as much voltage, and about 1.5 times as much amperage as the prediction that I previously made.</p>	
<b>Summary Statement</b> In my project, I used a microbial fuel cell to digest the organic compounds found in waste and generate electricity and clean water as products of the bacteria's metabolic activity.	
<b>Help Received</b> Mother and Father helped collect the benthic mud samples; Science Teacher collaborated with me regarding the project	