



**CALIFORNIA STATE SCIENCE FAIR
2010 PROJECT SUMMARY**

Name(s) Jake A. Forrester	Project Number J1111
Project Title From Garbage to Energy: Can Heat Generated in Composting be Reclaimed to Heat Domestic Water?	
<p style="text-align: center;">Abstract</p> <p>Objectives/Goals The hypothesis for this project was: If water is circulated through a heat exchanger coil embedded in a compost pile, then the temperature of the water exiting the coil will be significantly warmer than the temperature of the water entering the coil. The problem was: Can water be heated by circulating it through a heat exchanger coil embedded in a compost pile?</p> <p>Methods/Materials A compost pile was started and maintained by adding materials, moisture and air. Once the temperature of the pile reached above 100 degrees Fahrenheit, testing was started. Five tests plus one control test were conducted. Water was pumped from an insulated container through a copper coil heat exchanger embedded in the hot compost pile. The water was circulated for 48 minutes. Entering and exiting temperatures were measured every two minutes.</p> <p>Results In all tests, there were significant increases in the water temperature during the first 12 to 16 minutes. After that time, the water temperature continued to increase, but at a slower and steadier rate. The accumulated heat gains for the tests were: 28.0, 27.6, 24.2, 24.0, and 32.4 degrees Fahrenheit. The control test calculations determined that 10.1 degrees of the results were contributed from heat generated by the water pump with the difference generated by the hot compost pile.</p> <p>Conclusions/Discussion Overall, the testing was successful because it proved that heat energy can be reclaimed from composting. In addition, many pounds of materials were kept out of landfills and compost material was generated for use as fertilizer. Although the experiment was successful, it is probably not practical for residential purposes because of the large amount of composting material needed to generate significant amounts of heat.</p>	
Summary Statement This project tests whether or not the heat generated in composting can be used as an energy source to heat residential water.	
Help Received Mom helped type report, set up display board. Dad helped build compost bins, build heat exchanger, execute tests. Brother taught me about Newton's Law of Cooling, calculated the constant for the formula. Science teacher discussed ideas/questions, reviewed work each week.	