

The Solar Energy Containment Plant

New Mexico
Supercomputing Challenge
Final Report
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Team Number 105
Socorro High School

Team Members:
Malcolm "Alex" Montgomery

Teachers:
Mr. Bala Settu

Project Mentor:
Mr. Bala Settu

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I. Executive Summary

My original thesis was a plant that would revolutionize the world with its astounding solar energy usage and containment system. I researched diagrams and many pages of information, absorbing all of them for use later. I began to immerse myself in a constant state of cogitation on this very subject and later discovered that such items, though my idea was quite plausible and may have very well have been successful, would require not only an excessive amount of funds but also numerous tests to determine the outcome which we unfortunately did not possess. I then began to explore other routes since I was enamored about the idea of solar energy and how its use could possibly lead to a solution to various problems that we now face. As I said earlier I already contained a sizable amount of information and now began to use this in my project. I worked out several goals and summarized my information mentally and my project began to evolve. Though the one fly in the serum was that I did not have any programming done since I had not learned any that would be beneficial to my work. The Kickoff gave us an already set up program which did not teach me how to set one up which was what I needed. My project then took on its physical form first, when I presented my project at project evaluations. When I organized it to take the form of a power point presentation, my mind was opened up further and I began to get more concrete ideas rather than the abstract ones I had earlier. But my project was still in a very primordial state and it did not evolve into its full potential until the Sandia Labs Tour where I got to meet with the Star Logo members there and they opened my eyes to what the programming module could do, as well as teach me the codes. They helped me create a basic model which I then began to work on and, even though my limited programming abilities would not allow me to take my project to the full extent I wished it, I managed to get a decent model that allowed me to convey my ideas upon the screen. I also created a Dev C++ program that allowed me to calculate certain items in the program.

II. Statement of the problem

The problem was to create a large Solar Energy Plant that would power the city of Socorro without costing an exorbitant amount, that was efficient, and that would not take up too much space.

III. Description of my method

As I was not knowledgeable about solar panels or the various ways of collecting photons and converting them to electrons in the beginning, I first began to attack all the information with a ravenous and insatiable hunger. After I had gathered several diagrams and a wealth of information I then began to consider my problem and all its various aspects. It was through this process that I realized that I did not have the facilities and money to attempt the my original idea which was to build a plant that would not only power Socorro but would also be able to store energy. I then settled for just a plant that would power Socorro and not do all the things I wished it to. After I had settled upon that conclusion I began to think how I was to do this and how I wanted it done. After finding several options in my head and declining them, I conferred upon with a consult member as to what to do with my model. Mr. Dave Einhorn suggested that, since I was a one-man

team and my programming knowledge was limited, I do a simple star logo model. So now, I held a wealth of knowledge in my hands and the basis of a programming module yet no program. Since Star Logo runs off of “turtles” interacting with something or moving, instead of the original 3-Dimensional model that I had originally wanted, I had to discover another way to create a model using the limited resources I had. I waffled through several ideas containing things like, building a 3D image of a plant and using the turtles as recipients and producers of the energy required. Another was using the turtles as an individual solar panel and showing various outflows of energy coming from them. But this did not quite convey my point to the finite degree that I wanted it in, so I continued my dreary search. My first idea was using each turtle as either an electron or photon and showing them passing through the solar panel, but the big question was how. Before I move on to the finite details of the model, let me back up a little. In order to solve my problem, I needed to know how much energy Socorro consumed and how many solar panels it would require. I first began by writing to our *Socorro Electric Co-op* and asked them our current partaking of energy. I received the numbers needed in the standard energy form, kwh (kilowatts-hour). Since, at this time, the year of 2006 was not complete, I took our already existing values for 2005 and used them to work on a formula. Yet I failed to understand the difference between kilowatts *per* hour and kilowatts-*hour*. So my formula was completely unfounded. After doing more research I found out that it’s a measure of energy equal to how much energy is used in an hour. But I prevailed and I found that a triple-junction solar cell can power 70 milliwatts per square inch (1). So Socorro would need a lot of solar panels to power its needs. Now I focused on how to create such an energy plant and created a basic simulation in my mind. After the Sandia labs tour and I had gotten the privilege to sit down with some Star Logo people, I began to work on the first stage of my model which was transferring the picture in my mind onto paper. My model will be described later so it is of no consequence.

IV. My results

The results I gathered was most satisfactory and consisted of having a functional model which portrayed my idea quite efficiently as well as another C program which helped me organize my thoughts, a thorough knowledge of solar cells and their works, and my idea and plan efficiently transposed. The results of the study was that solar energy requires much more than I originally thought I did, and it is an inconsistent sort of energy. I saw that photons go through a solar panel and delve into certain processes until it emerges as an electron, or electricity and is taken to the needed source.

V The conclusions reached

The conclusions I reached was that I can efficiently power Socorro with my Solar Energy plant, that solar energy is a delicate process that none have quite mastered and that things that have not been done before must be tested.

VI. Software, graphs, and other references as a product of my work

I used Star Logo for my basis model and Dev Cpp as another add-in for my model. A graph I had is posted below and is the result of Socorro's energy drain.

	2005
Jan	16,173,607
Feb	14,930,950
Mar	13,605,548
Apr	13,707,448
May	12,293,222
Jun	14,305,290
Jul	15,168,356
Aug	15,587,562
Sept	15,770,092
Oct	13,756,571
Nov	13,085,855
Dec	14,886,597
Total	173,271,098

The Star Logo program consisted of turtles being created at a random x with a fixed y and each carrying a random charge than going down and hitting a blue bar (solar panel) and all turning blue (before they were photons now they are electrons) then turtles are randomly creating a different patch color (energy required) and the turtles each destroy one and stamp it black than die when they hit one. The Dev Cpp program, is a basic program which helped me with the lines needed per color (separate colors equal a different kind of energy needed) as, depending on how much energy from a certain source, more sources need more lines.

VII. Best achievement in project

My best achievement was when I learned enough star logo programming to actually start a model and understand what it is doing. I felt admiration, pride and victory swell in my breast as I had actually created something I did not think I could do.

VIII. The people and Organizations that helped me

First of all I would like to thank my supportive mentor, Mr. Bala Settu who acted as a constant brace against all that I was facing and gave me help and suggestions as what I should do. The other person is Mr. Dave Einhorn, who helped me considerably when he instructed me in what to do with my program and what module to use. The last person that I wish to thank is someone, which I regretfully don't know her name. It is to the Star Logo instructor which opened

my eyes and allowed me to do what I did. The only organization (minus the Socorro High School) that I would also like to thank is *Socorro Electric Co-Op* for their information and support.

IX. Bibliography

(1)= Mansoor, June 29th, 2006

http://karachi.metblogs.com/archives/2006/06/solar_energy_an.phtml