
MEMORANDUM

TO: EILEEN CASHMAN
FROM: JACOB TURNER
SUBJECT: REVIEW OF SERC AND CCAT FIELD TRIP
DATE: NOVEMBER 22, 2016

Purpose

The purpose of this memorandum is to provide a synopsis of the field trip taken to the Schatz Energy Research Center (SERC) and Campus Center for Appropriate Technology (CCAT) on Friday, November 18th, 2016 at approximately 8:30 a.m. in Arcata, Ca. A summary of the trip, a description of my favorite design projects, and the details and components of how the project will influence society and affect the environment will be included.

Discussion

It is imperative for engineering students to be able to understand and explain the complexities and numerous facets related to the design projects developed by CCAT, SERC, and other tech-related organizations. In time, the prospective engineers will learn through perseverance how one adds value, innovation, and fresh perspective to help mitigate the perpetually dynamic problems the world faces. This, along with how to manage the trade-offs pertinent to these solutions are what students may gain through visiting these organizations. There were several projects in progress by SERC I found to be very interesting, such as; the mini-grid systems in Bhutan, the fuel-cell hydrogen powered cars, and the effort to increase the world's flashlight standards by forming stricter regulation for foreign countries to abide by. I particularly liked that SERC has *many* different projects in progress that each make the world a better place. To me, this is the primary purpose of engineering. In contrast, CCAT is, in a way, the inverse of SERC, in that, it is *one* large project formed from a multitude of mini-projects. This creates an aggregate of many sustainable energy projects that form something magnificent; an energy independent home. This is a monumental (albeit incremental) vestige toward creating an energy independent society.

From the aggregate that is CCAT I found the solar water heater, and the heat pump to be most alluring. Both of these energy collecting methods were used to provide the geothermal heating system with hot water to efficiently heat the house, something that is normally very expensive and energy intensive. Solar water heaters are very efficient with a measured efficiency of 90-100 % as it essentially works by transferring the heat or energy from the sun to the water. Heat pumps are also very efficient and work by taking in water, condensing it, evaporating it and extracting the heat out to then re-circulate into the geothermal heating system. This project obsoletes the need for other methods of heating that may not be renewable (for example gas) or methods that may emit greenhouse gases in the process such as burning wood. Therefore the house doesn't need to connect to the grid for electricity to heat the house. In mass this could lower the demand of the more harmful methods of producing electricity. Over time this could have a massively positive effect on the environment if a large amount of houses switched to these methods of heating. One way in which I could be involved in this project at CCAT would be in the design process. The layout of the geothermal heating pipes would have to be planned out and I would do this using AutoCAD. A factor that would have to be included in the plan in AutoCAD would be how far apart the pipes would have to be, which I would calculate based on each pipes individual heat output. From this trip, the most interesting thing I learned was that you can insulate a house with straw or bale. Though, it is not the best insulator; it is readily available, easy to produce, and is a renewable source with little to no environmental impact.

Conclusion

The field trip to CCAT and SERCA allowed the prospective engineers an opportunity to learn from an authentic engineer's work setting. This gave an opportunity for us to further grasp the difficulties and problem-solving skills environmental engineers must utilize on a regular basis. Furthermore, the lab group was able to ask questions and learn from an experienced engineer and a more experienced engineering student allowing us to better prepare for what our future has in store and what problems we may soon be dealt.