

US EPA ARCHIVE DOCUMENT

GRO Summer Internship Final Report
Energy Efficiency in the Food Processing and Data Center Industries
Nathan Nesbitt
Worcester Polytechnic Institute, Worcester, MA

Do you know where 1.5% of all the electricity in the United States went in 2006? It powered data centers, rooms full of rows of server racks which run the Internet, paperless billing, and cell phone companies, to name just a few. If you are unfamiliar with server racks, imagine 10 to 15 computer towers on their sides stacked one on top of another, all wired together. A data center has hundreds or thousands of these. A 2007 "Report to Congress on Server and Data Center Energy Efficiency Opportunities" stated the above statistic, also noting that data center electricity consumption was increasing by 12% a year. Department of Energy Data (DOE) data show that during the same time, the electricity consumption of the country as a whole increased by 1.1% a year, twelve times less than that of data centers. This is an issue that has recently begun to draw substantial attention from policy makers, such as the Environmental Protection Agency (EPA).

Energy Star, an EPA program that acknowledges products and facilities that operate under high energy efficiency standards, provides a reputable means for companies to secure a "green" image. The Energy Star logo is recognized by over 70% of Americans, and also in Canada, the European Union, Taiwan, Japan, Australia, and New Zealand. To receive the Energy Star label, a facility must perform with an energy efficiency in the top quartile of comparable facilities. Only certain types of facilities qualify for the Energy Star label, as there must be a sufficient data set for the comparison.

For industrial facilities that do not fall into one of the 14 eligible types, there is an alternative program they can enter for recognition, the Energy Star Industry Challenge. This challenge will not earn the company a label, but rather promotional materials for its facility to inspire employees about the sustainability measures the company takes, and permission to include the Energy Star logo on the company website with explanation of the company's success. To complete the challenge, a facility must reduce its energy intensity by 10% within 5 years of its benchmark year.

My work this summer in the Energy Unit of EPA Region 1 Headquarters in Boston, MA, focused on promoting Energy Star to data centers and the Energy Star Industry Challenge to food manufacturers. The Energy Unit seeks to address climate change by reducing the emission of carbon dioxide. Environmental Scientist Linda Darveau mentored the projects, while Cynthia Greene, the Acting Manager of the Energy and Climate Unit of the Air Division of Region 1 EPA HQ was my Project Advisor.

For the Industry Challenge, my work involved reaching out to companies, informing them of the programs, and visiting their facilities if they were interested in learning more. This proved to be a tedious and disappointing process. The summer is a busy season for the food industry, and they often have annual week-long shut-downs. Consequently, only two companies were interested in learning more about the program. One that I found early on never followed through on providing necessary information to enroll the company in the program. My technical skills associated with my physics major were utilized slightly for a return on investment analysis for this company on a retrofit of their T8 lights (standard fluorescent lights bulbs) with LEDs. However, the analysis was never completed as the company never provided its electricity costs. In the last week of the internship a second company returned my call. I visited its facility on my last day to educate personnel on the mechanics of the program.

The data center project was much more fruitful and engaging. Although data centers also experience annual shutdowns in the summer, electricity constitutes roughly half of their operating budgets. Consequently, they have substantially more interest in learning how to reduce their energy consumption, and publicize their efforts. Facility managers of data centers have little control over the design of the servers they install, which are produced by computer manufacturers such as IBM. However, roughly half of the electricity consumed at a data center is used to cool the hardware, which provides opportunity for the managers of data center facilities to explore energy savings by customizing the layout of their data center, and the cooling system used.

When I started my internship on June 1, I was asked if I would have interest in working on a data center project in addition to the food processing project. Linda's idea for the data centers was to build off of a recent energy efficiency summit held at Juniper Networks Inc., and hold a round table event which would include my presentation on the Energy Star label for which data centers became eligible "space types" on June 7. I worked with several contacts Linda provided from Juniper to organize the event, and following some initial hurdles associated with their shutdown and several ongoing onsite projects, I established a date for the meeting. It was labeled the "Energy Star Data Center Forum," and working from a list of contacts, I invited a modest number of other companies to attend. From the extension of invitations to the holding of the forum took 13 days. During this time, everyone I invited confirmed their attendance, requested to bring someone else from their facility, and many requested I invite other companies from which they had contacts. The forum totaled 24 attendees from 10 companies, all facility managers or information technology support, except for five representatives from National Grid and the EPA, combined. The forum lasted four hours, and progressed smoothly. Conversation was lively among the well educated attendees, with exchange of knowledge about rebate programs, promotional programs, best practices for energy efficiency, and innovative technological solutions providing increases in energy efficiency. The evaluations demonstrated satisfaction beyond the attendees' expectations, and nearly everyone was interested in attending further meetings. About half were open to hosting follow up meetings.

I expressed interest in continuing work on the data center project to my mentor and Project Advisor, and will potentially volunteer my time throughout the year on an informal basis to help plan further sessions. The opportunity to work with individuals in the industry who have the capacity to make actual change that will affect carbon emissions was extremely exciting, and I made a number of valuable contacts in the process. A significant lesson I took away from the summer experience was the value in pushing to make events happen in spite of the doubts of others. When planning the data center forum, some people with whom I worked had substantial doubts that the forum could be organized in the short time frame available. It turned out to be a great event, and the highlight of my summer. If I had to pick one piece of advice for future interns, I would recommend that they be bold, and push for projects that seem inspiring and interesting, despite others' doubts.