

IROP eWaste Recycling Proposal

Electronic waste (e-waste) is the fastest growing waste stream in the world. According to the EPA, not even 16% (by weight) of e-waste is recycled. Groundwater contamination and airborne pollutants are only some of the dangers associated with dumping e-waste in landfills. Due to a lack of environmental regulation in the United States and the high cost of recycling e-waste (companies have to pay to dispose of broken equipment), many companies opt for the less expensive option: shipping their e-waste overseas to dump in developing nations.

RECYCLA is an e-waste recycling company in Santiago with a goal to expand their business and process 50% of the e-waste in Chile. Besides the environmental benefits to expanding their services, RECYCLA will also hire more workers from a local prison to help reintegrate criminals back into society. My part in this project will be to devise a new factory layout to allow RECYCLA to expand efficiently and effectively and provide a model for processing e-waste.

E-waste recycling is a relatively new industry and, in general, decomposition of electronic materials has been done on small scales by hand. There are many opportunities to increase efficiency and e-waste decomposition rate. However, the goal of this project is to improve the efficiency of e-waste recycling in RECYCLA's factory by the end of the summer. From preliminary research, it seems a reorganization of the factory floor will create the biggest impact on processed e-waste per month. In the next two months, I will verify that reorganization is where the most efficiency can be gained by talking with e-waste recycling experts around the world. Armed with expert advice and a theoretical background, I will have complete control over the direction of this project. During August, the factory will be shut down and potential designs will be experimented with. I will produce a report on the different designs and their process efficiencies. By the end of August, I will leave the company in the most efficient configuration as determined by experimental data.

June

- Communicate with RECYCLA to determine feasibility of design
- Develop intimate understanding of reasons behind decisions made in e-waste recycling factories in the United States
- Connect with faculty at MIT doing research on e-waste recycling manufacturing processes
- Communicate with RECYCLA to determine the status and configuration of factory in Santiago
- Visit e-waste recycling centers
- Understand the reasons behind the factory set-up
- Create diagrams of floor plan of visited that I have visited

July

- Make designs of RECYCLA factory floor
- Communicate with RECYCLA to determine feasibility and logistics of design for factory floor
- Investigate the legal code in Chile with respect to the disposal of hazardous waste
-

August

- Implement different designs at factory in Santiago, Chile
- Collect efficiency data
- Leave RECYCLA's factory floor in the most efficient configuration
- Write and deliver a report

For the month of August, I will be in Santiago, Chile, working with RECYCLA to implement the ideas developed over the summer. I have always been interested in the interplay of statistics and

optimization. As a major in mechanical engineering and mathematics, my career interests focus on operations research and industrial engineering. This project of redesigning a factory floor for efficiency falls directly into my anticipated future field. The environmental aspect is the main reason I am interested in this project. While optimizing systems for greater output and profit is valuable; making a positive environmental and social impact is both valuable and satisfying.