Our purpose in ALCOA Project 2 was to create a more efficient and sustainable way to utilize aluminum through ALCOA on our Pennsylvania State University Campus. We decided to create a waste bin model consisting of one half for trash products and one half for recycling products. We hope to implement these bins throughout campus and in areas where recycling was not an option previously. We wish to encourage more recycling of aluminum so that it can be reused in the future.
A. Definition of Needs and Requirements

After researching aluminum and recycling on campus, we found that in various areas, our campus was not as efficient as possible regarding these subjects. We discovered that although there are many recycling bins in the dining halls and dorms, there is a very small amount outside and in classrooms. The public recycling bins are sufficient, but as far as personal spaces go, improvement must be made. We realize that without access to recycling, a lot of energy and money is lost. More waste is going to the landfill and causing more pollution, while recycling is being ignored. We understand that sustainability means that a group of people or a campus can implement something new and beneficial while keeping the innovation stable for a long period of time. Our goal is to somehow use aluminum and make the campus more efficient by either preserving it or using it in a more productive way. If we develop something to help aluminum be recycled more often so that it can be reused, the campus may improve environmentally. We also want to make sure other students are aware of the ability and importance of recycling where they might not have been before. We know that no number of recycling bins is too many and there is always going to be a need for recycling. By doing this, we can improve the quality of life of so many on campus.

[Image of recycling symbol]

http://sustainability.psu.edu/mobius
http://news.psu.edu/tag/recycling
B. Detailed Description of Competing Alternative Conceptual Options

Ideas based on the 5 criteria:

Pie Dish:

Pie dishes are used around campus for several different reasons. The pie dish, however, is most likely thrown into the trash after use. By creating a solid aluminum pie dish with a thicker support, these pie dishes will not have to be thrown away. Since the dish will be smooth and have no cracks, cleaning and reusing the pie dish will be easy and efficient. The remodeling of the pie dish will have several different effects. The first criteria it will affect is human factors. Although small, changing the pie dish will save time, which will save also money. Considering it’s a minor change to the product, it is not very innovative. Also, the quality of life will be changed. Not directly but when the pie dish is recycled, this can be used for other products which will benefit the consumer down the road. As far as implementation goes, this fix will be easy and not challenging to fully run on the new pie dishes. A simple swap of dishes in the dinning commons and restaurants will be all that is needed. The cost of the dish may increase slightly but not that much to make a big difference. Finally, the product is economically viable. Less waste and more recycling will make a company more efficient.
Aluminum wrappers:

The initial problem with aluminum foil food wrapping is that very little of it is recycled. Most people throw the wrapper in the trash when finished. Because of this, a lot of aluminum on campus is going to waste. It is not solely the consumers fault for not recycling the aluminum, there is a thin sheet of paper on one side that makes it difficult to determine if the item should be recycled or not. A solution to this problem would be to switch from foil to paper. Paper is less expensive than aluminum and would cut down on the wasted aluminum. Also because there is no debate on what material the item is made from it can be more easily recycled with other paper. The only human factor involved once the change is made would be if the consumer decides to recycle the paper or wastes it by throwing it in the trash. This is not something new. It is a simple change that can make a big difference on campus. Quality of life can only go up by making this change, because less materials are being wasted the environment will benefit, sustaining it for longer human use. It will not be hard to implement this idea because it is just as easy, if not easier, to get food wrapping paper as it is to get aluminum foil. Finally it is very economically viable to make this change because of the savings in cost and the gains in recyclability.

Bottles Instead of Cans:

In vending machines, often aluminum cans fill the shelves. This aluminum may be overused and that could prove to be disadvantageous. If all of the drinks in every vending machine on campus are made from aluminum cans, aluminum is not being conserved and is being used too much. On top of this, if those cans are not being recycled, more problems can arise. Therefore, to
combat this problem, we can replace all of the aluminum cans in the vending machines with bottles made from plastic. In this way, we can preserve the aluminum for higher-quality products and use this eco-friendly plastic instead. The quality of the drink can then be improved, it is extremely easy to implement, and is economically viable. Overall, it will improve efficiency in society.

The Garbage Cans:

One of the problems that our group saw was that not all people on campus take the time to find a recycling can, so they just throw their recyclables in the garbage cans. We thought that the best possible solution to this problem is to make all garbage cans on campus half for recyclable materials and half for the non-recyclable trash. This idea is cheap and easy to implement. It would take less than a week to replace all trash cans or to put a divider in them. Also, replacing the garbage cans would improve the quality of life for all because more recyclable materials are being recycled. The one problem that would face this solution is the fact that some careless people would throw non-recyclable materials in the recyclable side of the garbage can. This would have to be compensated for by additional workers sifting through the garbage.
### C. Concept Options Analysis/Selection & Combination

<table>
<thead>
<tr>
<th>Criteria / Requirements</th>
<th>Weight factors of criteria</th>
<th>Reuse pie dish and other kitchen dishes</th>
<th>Use paper not aluminum</th>
<th>Use bottles instead of cans</th>
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<th>WF Percent</th>
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<tr>
<td>Human Factors</td>
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<tr>
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<tr>
<td>Economic Viability</td>
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<tr>
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### Comparison Matrix:

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<th>Criteria Requirements</th>
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<th>Quality of Life</th>
<th>Implementation</th>
<th>Economic viability</th>
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<th>WF Percent</th>
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<tr>
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<td>0</td>
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<td>2</td>
<td>2</td>
<td>20%</td>
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D. Detailed Description of the Selected Final Concept Proposal

The idea that received the highest score according to our decision matrices was the half-waste, half-recyclable container. We hope to place these garbage bins across University Park in order to encourage recycling and reduce waste in landfills. The following information will demonstrate the aspects and benefits of this proposal.

Human Factors: People become more conscientious of recycling (Aluminum)

Innovative: Split Trash cans are rarely used in private settings

Quality of Life: Quality of life increases with less waste being sent to landfills

Implementation: Personal trashcans will be replaced throughout campus within a week by a team of students

Economic Viability: Will increase aluminum recycling while maintaining same cost as before

What Will Change:

Public:
Present Circumstances at UP

Public:
785 waste bins
4715 recycling/compost bins
64% waste diversion
36% of recycling goes to landfill
15,000 tons of solid waste in 2012
Personal
6500 waste bins
0 recyclable bins
4.3 lbs. of waste a day
1.5 lbs. of recycling a day

**Pounds of Waste and Recycling Before and After Design For a Single Individual at State College**

<table>
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<th>Weight in Pounds</th>
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<tr>
<td>Waste per day</td>
<td>Before After</td>
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<tr>
<td>Recycling per day</td>
<td>Before After</td>
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<tr>
<td>Waste Diversion</td>
<td>Before After</td>
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</table>

☐ Before  ☑ After
Block Flow Diagram & Process Flow Diagram for “Garbage Can” Idea:

- **Aluminum Products**: Aluminum products are placed in “half and half” trashcans across campus.
- **Waste Products**: Waste products are placed in “half and half” trashcans across campus.
- **Trashcan**: Aluminum products end up in a recycling sorting center to be reused. Waste Products end up at a landfill.
- **Recyclable Section**: Helps to conserve and reuse aluminum products efficiently.
- **Waste Section**:
- **Sorting Center**:
- **Landfill**:
Additional Websites Used:

- [http://www3.imperial.ac.uk/facilitiesmanagement/softservices/wasteandrecycling/recycling%20faq/whysouldwerecycle](http://www3.imperial.ac.uk/facilitiesmanagement/softservices/wasteandrecycling/recycling%20faq/whysouldwerecycle)
- Sustainability Institute Communications Team