

ZERO WASTE FOOTBALL

Product Conversion

Global Sustainability, 2011

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TABLE OF CONTENTS

ABSTRACT

INTRODUCTION

PRECEDENT

GETTING STARTED

FINDING ALTERNATIVES

Composting

Recycling

Black Bear Composting

UVA Concerns

COST ANALYSIS

Alternative Product Data

Price Comparison

Cost Analysis

Other Cost Considerations

TIMELINE

FUTURE WORK

LESSONS LEARNED

CONCLUSION

APPENDICES

ABSTRACT

Our objective as the Product Conversion faction of the Zero-Waste initiative is to find sustainable alternatives for the products currently used for concession sales at Scott Stadium.

The first step we took to achieve this goal was evaluating previous efforts within the UVA community towards sustainability. This included work already completed by Matt Boegner and Ashley Badesch on the Zero Waste Initiative at Scott Stadium. We also researched universities and institutions that were successful in their own zero-waste endeavors. We then contacted community partners and collaborators including Kendall Singleton, Jess Wegner, and Rodney Griffin to further this research and determine ways to continue forward.

Over the course of the semester we proceeded to research alternative products and analyzed their feasibility at Scott Stadium based on cost, performance, and environmental impact. We then compiled all alternative solutions and performed a preliminary analysis based on these three factors to determine the most practical alternative products. Using this information we then completed a cost analysis comparing current products with alternative solutions. We expected alternatives to be more expensive overall; however, many of the alternative products are actually less expensive than the ones currently being used.

In conclusion, our research proves that the conversion of many of these products is not only more sustainable but also more cost efficient.

INTRODUCTION

The overwhelming amount of waste produced throughout the United States is causing landfill expansion and increasing the amount of fossil fuels needed to transport the waste to the landfill site. Annually, the United States produces about 243 million tons of municipal solid waste, 4.3lbs of waste per person per day. Paper products compose the largest amount of waste, reaching nearly 68 million tons per year in the US (Non Hazardous Waste). However, 43 million tons of paper products were recovered, meaning 60% was ultimately recycled or composted. Plastics accounted for 22.4 million tons of waste, of which only 5.4% was recovered for recycling. Waste entering landfills contaminates surrounding areas and ecosystems, releasing methane into the air and ground. Many of products entering landfills have the potential to be recycled or composted.

In congruence with the United States as a whole, the UVA community has contributed to these unsustainable waste management practices, producing over 3,000 lbs of food packaging waste each football season (Badesch and Boegner). The Zero-Waste Football Initiative seeks to alleviate the growing pressures put on landfills by altering current practices during football games. In collaboration with other factions of this initiative, we seek to decrease waste entering landfills as much as possible. Other groups are assessing behavioral and operational changes including: encouraging use of existing recycling bins, providing composting bins, and determining associated costs of composting and recycling. Our group's specific goal is the conversion of as many non-recyclable and non-compostable products into sustainable alternatives. The success of all these groups is crucial in achieving the Zero-Waste Football goal.

The relationships already established with our community partners and collaborators by Ashley and Matt provides a solid foundation for our group. Community partners include Jess Wegner, Environmental Projects Manager, and Jason Bauman, Associate Director of Athletics for Facilities and Operations. We also collaborate with Rodney Griffin, General Manager for Cavalier Concessions and Clothing, Kendall Singleton, UVA Dining Sustainability Coordinator, Craig Coker, Principal of Croker Composting and Consulting, and Eric Walter, Owner and Manager of Black Bear Composting. Our further continuation of these relationships has guided us in this process. The greatest concern in product conversion as held by our community partners and collaborator is maintaining customer satisfaction and keeping costs down.

Our main stakeholders are the UVA community and football patrons, as all changes made for the Zero-Waste Football Initiative will directly affect these groups. While we aim to significantly decrease waste sent to landfills after football games and promote sustainable practices, we must also ensure that these stakeholders are both equally satisfied with their football experience. Composting, recycling, and solid waste companies will also be stakeholders in this initiative. We have selected Black Bear Composting, just recently opened in October, as the best potential composting site for UVA football. While this will bring in revenue for Black Bear and has the potential to enhance the composting facility, there are concerns over the products being composted and how their associated volume and chemical make-up will affect the operations at Black Bear. Employees at UVA will also be stakeholders in this endeavor. Product conversion will alter the operations at Scott Stadium, ultimately changing the nature of work done by employees. This also means a possible increase or decrease in demand for labor.

Product conversion entails a balance between cost, product performance, and environmental impact. The alternative solutions that we research and select will be evaluated based on these three factors in order to determine the best products for Scott Stadium Concessions. Currently, most products used through Aramark are non-compostable. Even for the few products that are compostable, there is no means to compost them properly at the stadium. While we understand that UVA has hesitations regarding cost increase, our research proves that decreasing long-term environmental impacts paired with competitive product performance is sufficient reason to undergo product conversion.

PRECEDENT

The Zero-Waste Initiative began at Ralphie’s Green Stampede at CU Boulder. Many of the design strategies and tactics were derived from the successes at CU’s football stadium. Within the first year, CU diverted 90% of all waste from landfills. Because of its comparable size, local resources, and success, Ralphie’s Green Stampede was an obvious precedent.

Ashley Badesch and Matt Boegner initiated the Zero-Waste Football project at UVA in the fall semester of 2010. The project gained momentum throughout the UVA community, fostering the continuation of a stronger initiative. Over the course of the fall 2010 semester, Badesch and Boegner set up outlines and goals for the initiative, seeking future implementation. This fall semester 2011 our group has joined the initiative to help further the progress of product conversion for this project. Boegner and Badesch have provided us with substantial background research as well as clear goals for how our group should continue. While this project is now closely tied to us, ultimately it is the vision of Boegner and Badesch.

GETTING STARTED

Our research began with taking a closer look at the data that Matt and Ashley had collected from last year. Below is a chart they produced including products in need of conversion and a cost analysis.

Table 1: Previous Cost Analysis

**Zero-Waste Initiative
2010 Cavalier Concessions Football Units Sold**

Item		Units sold	Est. Cost of 2010 Volume	Estimated Cost of Compostable Alternative	Price Difference
22oz Cups	(recyclable plastic)	45,130	n/a	n/a	\$0
32oz cups	(recyclable plastic)	33,922	n/a	n/a	\$0
Bottled Water	(plastic bottles)	61,065	n/a	n/a	\$0
Bottled Soda	(plastic bottles)	23,340	n/a	n/a	\$0
Hot Dogs	(foil bags)	24,974	\$1,293	\$1,318	\$25
Burgers	(foil bags)	4,652	\$501	\$682	\$181
Wing Trays	(paper trays)	6,568	\$1,135	\$1,878	\$743
Fry Cups	(paper cups)	5,140	\$1,014	\$1,023	\$9
Pizza	(cardboard boxes)	10,534	\$1,901	\$3,235	\$1,334
Total		215,325		Total Price Difference for Products (additional expenses):	\$2,292 per year

In addition to the items listed here, we concluded that napkins, plastic cutlery, nacho trays, popcorn tubs, Gatorade cups, and hot cups would also need to be converted. We immediately began research on each product seeking a recyclable or compostable alternative. Along with the search for alternative products, it was crucial that we understood the reason why these products were unable to be recycled or composted, and why an alternative product has that capability.

We used Cedar Grove, a composting company located in Everett, Washington, as a reference for a range of compostable products. They provided a comprehensive list of products that are suitable for composting. To gain further insight on this topic we contacted Craig Croker, Principal of Croker Composting and Consulting. He referred us to Eric Walter, Owner of Black Bear Composting, a local composting site recently opened in October 2011. With Eric's help, we determined that cardboard pizza boxes and wax-lined Gatorade cups could be composted. Initially we asserted that because of the grease content leftover in the pizza boxes, compost companies would not accept them. However, Walter explained that because of the high volume of materials sent to Black Bear, greasy items can be tolerated. Secondly, we learned that because of the high temperatures associated with composting, wax is broken down naturally. These processes are explained in more detail in future sections of this report. This opened our research to a range of wax lined compostable alternatives.

To further our understanding of current product use, we met with Rodney Griffin, General Manager of Cavalier Concessions and Clothing. In our meeting with Griffin, we gained greater insight on the strides that Aramark and UVA have already made towards sustainability. Within the past year, both napkins and plastic cutlery have been converted to alternative compostable products. We also learned that many of the plastic products used: beer cups, wine cups, nacho trays, etc., are recyclable. Unfortunately, these products are often thrown in the trash. As a result, we continued research to find alternatives that could be disposed of in a more sustainable manner. Unfortunately, Griffin explained that the conversion of 32 oz souvenir cups and 24 oz reusable fan cups are non-negotiable items for conversion.

The meeting with Griffin proved that Aramark and UVA support sustainable alternatives when it is feasible and sensible for them to implement. While cost is a primary concern, Griffin made it clear that product performance is equally important to UVA concessions. Griffin expressed that due to operations and customer satisfaction these products have not been converted to a sustainable alternative:

Foil Hot Dog/Hamburger Bags- the foil retains heat while the paper lined inside absorbs grease; foil can be recycled and paper can be composted, but because they are combined, neither sustainable practice can be performed and it must be thrown away; concessions pre-bag hamburgers and hot dogs for efficiency during operation so it is essential that the packaging product retain heat for extended period of time

Plastic Lined Popcorn Tub- lining absorbs grease, preventing leakage; use of tub also creates higher efficiency during operations so employees do not have to fumble with opening of bag; convenient for customer use and retains heat

Plastic Lined Fry Cup- similar to popcorn tub but smaller scale; retains heat, absorbs grease, prevents leakage and easy to operate

Plastic Lined Wing Tray- plastic lining prevents grease from leaking, easy to operate, and does not absorb heat so comfortable for customer; used with paper liner

With this new insight we finalized our product conversion list as follows:

Table 2: Product Conversion List

	Product	Material	Current Disposal Method	Future Disposal Method
1	3 lb Food Tray	Plastic Lined Paper Product	Throw Away	Compost
2	Hot Cup	Plastic Lined Paper Product	Throw Away	Compost
3	Popcorn Tub	Plastic Lined Paper Product	Throw Away	Compost
4	Fry Cup	Plastic Lined Paper Product	Throw Away	Compost
5	Hot Dog Bag	Paper Lined Foil Bag	Throw Away	Recycle/Compost
6	Hamburger Bag	Paper Lined Foil Bag	Throw Away	Recycle/Compost
7	Nacho Tray	#6 Plastic	Recycle	Recycle/Compost
8	9 oz Wine Cup	#6 Plastic	Recycle	Recycle/Compost
9	24oz Beer Cup	#6 Plastic	Recycle	Recycle/Compost

In our preliminary research we also determined that Black Bear Composting is a more practical site than Royal Oak Farms. Because it just opened in October 2011 it was not considered last year in Ashley and Matt’s research. Black Bear Composting is located just outside of Charlottesville, Virginia in Crozet. Prior to the opening of Black Bear, the nearest composting site was located hours away in Lynchburg, Virginia. In efforts to reduce carbon footprint, Black Bear Composting is much more desirable for the Zero-Waste Football Proposal. Craig Coker informed us that Black Bear is a Category four Full composting site, the highest level obtainable in Virginia. Full composting sites are able to absorb 700 tons per quarter of compostable materials. Learning that Black Bear Composting is category four, our previous concerns regarding grease content of pizza boxes and food are no longer an issue. Due to the volume of mixed materials and turnover rate, category four sites are able to tolerate products with higher grease content.

FINDING ALTERNATIVES

Composting

Compost is a post-consumer product heavily affected by the materials it ingests. Understanding how various materials affect the system provides insight in our search for alternative products.

Compost is created when you provide the right mixture of key ingredients for microorganisms to initiate decomposition of organic materials. These microorganisms will eat, multiply, and convert raw materials to compost as long as the environment is right. When the right mixture of: food, water, and air are provided, composting can regenerate key nutrients into the soil that sustain the soils growability. Food for these microorganisms consists of two classes of materials, referred to as “Greens” and “Browns.” Green materials are high in nitrogen, while brown materials are high in carbon. The green materials provide protein for the microorganisms, while the brown materials provide energy (The Garden of Oz). Compost is useful for erosion control, land and stream reclamation, wetland construction, and as landfill cover. It also can alternatively be used to generate biogas through anaerobic digestion. In a discussion with Craig Coker we learned that:

“Treating biodegradable waste before it enters a landfill reduces the amount of methane entering the biosphere; untreated waste breaks down anaerobically in a landfill, producing landfill gas that contains methane, a potent greenhouse gas, where as in composting, an aerobic process, bio gasses of carbon dioxide are released that do not hurt the biosphere but rather engage the growth of new greenery.”

If methane is not controlled at a landfill, it can seep underground and into nearby buildings, where it has the potential to explode. Yard wastes also contribute acidity that can make other waste constituents more mobile and therefore more toxic. Composting ultimately reduces global warming by reducing the methane that causes our world climate temperatures to increase.

Black Bear Composting

Through our connections with Eric Walter we received valuable information about his facility and what we can and cannot compost. From Walter's e-mails:

"Here's what I learned about composting wax-coated paper. The high temps of commercial scale composting plus the microbial activity break down the wax of wax paperboard quite efficiently. Apparently, there are ways to separate wax from paperboard, so the paper could be recycled, but it's a pretty costly process. For recycling, composting appears to be the more cost-effective and least intensive process. However, from a composter's perspective, we need to compost waxed paper in reasonable recipe ratios or we'll find higher levels of boron in the finished compost."

*"Black Bear's program is based around collecting in our 65 Gallon Roll-Carts. We charge an initial set-up fee for training, signage, and delivery of carts. We typically charge a one time set-up fee of \$50 + \$5 for every additional cart. For example, if Scott required 20 carts, we would charge \$145 set-up (\$50 + (19 * \$5)). Once the carts are in place, we charge per "pull" which means every time we collect from the cart. In our case, we replace the cart with a clean one. Based on Scott Stadium's location, we would charge approx. \$9 per cart pull. Using the 20 cart example, collecting 20 carts after a game would be \$180. To help the comparison to trash service, we're estimating that our roll carts will on-average weigh 250 pounds. To that end, 8 roll carts would equal a ton."*

Recycling

In our research of alternative products, we found more composting alternatives than recyclable ones. For this matter, one must understand the levels of recycling and why, even if a product is already recyclable, there may still exist a more sustainable option. Below is a list of the recycling levels and the products associated with them

Table 3: Categories of Recycling

#	Material	Common Products	Acceptance
1	Polyethylene Terephthalate PET or PETE	Plastic bottles	Most curbside programs, all recycling centers
2	High-density polyethylene HDPE	Detergent, Shampoo Bottles	Widely accepted
3	Vinyl or polyvinyl chloride PVA	Children's toys, shower curtains, fashion accessories	Rarely accepted
4	Low-Density Polyethylene LDPE	Shopping bags, reusable drink & food containers	Most recycling centers, some curbside programs
5	Polypropylene PP	Yogurt and deli takeout containers, Tupperware	Most recycling centers, some curbside programs
6	Polystyrene PS	Egg containers, takeout food containers	Some recycling centers, rare curbside programs
7	Polycarbonate PC and other plastics	Sunglasses, DVDs	Rarely accepted

** All data taken from www.plantegreen.com

A great percentage of the waste produced at Scott Stadium during the football season has the capability to be recycled or composted, yet is tossed in trashcans and sent away to landfills. We were able to further examine these disparities through a waste audit completed by the Waste Quantification Group and better understand how their research could aid our task of product conversion. Below are some statistics from a waste audit taken by the Waste Quantification Group of the Zero-Waste Football Initiative during this football season:

Table 4: Waste Audit Data

Location	Food	Paper	Recyclables	Trash	Total Weight (lbs)
Locker Room Trash Bin	6.44%	9.09%	70.57%	13.90%	37.41
Recycling Bin	0	0	93.94%	6.06%	6.60
Main Section Trash Bin	40.91%	24.75%	21.21%	13.13%	39.60
Vendor Trash Bin	0	0	81.82%	18.18%	6.60
Upper Level Trash Bin	23.08%	34.64%	19.23%	23.08%	5.20
Main Entry Trash Bin	50.00%	17.65%	20.59%	11.76%	6.80

These statistics show that a majority of the waste being sent to landfills is actually recyclable and compostable. The greatest percentage of trash from a single trash bin was 23.08%, meaning that in all trash bins, over 76% of the content had the potential to be diverted from landfills. Presently, Scott Stadium has no method of composting installed. However, there are extensive recycling opportunities in place. UVA accepts all recycling numbers 1-7; the only exception is #6 Styrofoam products. All of the plastic products currently being used by UVA concessions, including the Souvenir cups and Fan cup that cannot be converted, have the potential to be recycled. These statistics make it clear that by properly sorting recyclables and sending them to the correct facilities, we can very easily begin to decrease unnecessary waste production. In addition, with the future conversion of products to compostable alternatives, we can continue to decrease the volume of waste sent to landfills.

UVA Concerns

Other issues arose in our conversations with Rodney Griffin concerning product-pricing estimates. We learned that football concessions are lumped into the same ordering system with all other sports. In order to feasibly consider conversion, it must make sense for all sports concessions, not just Scott Stadium. Aramark was unable to disclose product volume and cost information, hindering our research process. Most distributors we spoke with were also unable to disclose cost information to us. Jess Wegner, together with the help of Matt and Ashley, was able to give use cost information per 1000 units. By providing a cost comparison, Aramark and UVA Concessions can easily see the two prices and adjust it for their private ordering purposes. With this information we began compiling our cost analysis.

COST ANALYSIS

Alternative Product Data

We were able to find many alternatives to the current products being used that are more eco-friendly and sustainable, yet maintain the same level of customer satisfaction and product performance.

Table 5: Alternative Products

Product	Alternatives	Alternative Description	Distributor	Price/1000
3lb Food Tray	EcoCraft Natural Kraft	Made from recycled natural kraft paper stock using an FDA-approved, chlorine-free manufacturing process with soy blend eco-wax to provide a moisture and grease resistant coating. Strong walls made of unbleached paperboard that reduces raw material waste by 21% during production compared to bleached paperboard food trays.	Foodbizsupply, Webstaurant Store	\$40.44




Wing Trays:

Currently, the trays Scott Stadium uses are plastic lined and non-compostable. The trays primary use is for serving wings. The alternative product we found is nearly identical to the current product being used. They are the same size, resistant to grease and moisture, and sturdy. However, their wax lining allows them to be composted. They are also made out of recycled material, offering an even more sustainable alternative.


Product	Alternatives	Alternative Description	Distributor	Price/1000
Popcorn Bags	EcoCraft Natural Kraft 46oz	Unbleached grease resistant paper, 100% post consumer recycled paper and soy wax, home compostable, recyclable, commercially compostable, leak resistant and grease resistant	Foodbizsupply	\$105.98





	Green Paper Products 32oz	Compostable, biodegradable, corn based resin	Green Paper Products 	\$231.98
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Popcorn Tubs:




Popcorn tubs currently used in the stadium pose the same problem as the wing trays; the plastic lining prevents the paper product from being composted. The popcorn bag alternatives we found share the same benefits as the wax lined food trays; they are grease resistant as well as compostable and recyclable. The difference between this alternative and the original product is the structure of the container. The product currently used is a sturdy, plastic-lined, cylindrical container. The alternative is a paper bag. While the tub is sturdier, the alternative does not sacrifice quality or convenience. Serving popcorn in a bag is common and offers the same level of customer satisfaction as a tub. Furthermore, the price of these popcorn bags is significantly cheaper than the product we are currently using. The alternative offers a 61% decrease in cost. By converting to this product, UVA could decrease cost, environmental impact, and landfill waste.

Product	Alternatives	Alternative Description	Distributor	Price/1000
Fry Cup	EcoCraft Natural Kraft	Compostable and recyclable, grease resistant	Foodbizsupply 	\$63.34

	Solo Grease Resistant Paper French Fry Cup 16 oz	Grease resistant, compostable (approved by solo compostable)	Foodservicedirect 	\$115.15
	Bare by Solo 10 oz	Vegetable lined paper, biodegradable compostable, microwave safe	Foodbizsupply 	\$128.18



Fry Cups:

Fry cups currently used are also a plastic lined paper product. EcoCraft Natural Kraft manufactures the first alternative we chose. While this product is more cost efficient than the current product used, offering a 24.6% decrease in cost, we acknowledge that it may not be a suitable alternative in terms of customer satisfaction. The bags seem like it might be bit flimsy and also quite small. However, there are other alternative eco-friendly fry cups that are almost identical in form as the cups we currently use, and comparable in price. The Solo Grease Resistant Paper option is grease resistant, certified for composting, and looks almost identical to the current product used; however, there is a price increase for this product of about 27.1%. The 10oz bare by Solo is lined, biodegradable, and compostable. While these cups are intended to hold hot beverages, they are basically the same size as the fry cups and would serve the exact same purpose. Furthermore, the price is identical to the current product used.

Product	Alternatives	Alternative Description	Distributor	Price/1000
Burger Wrap	6" solo Bare Hinged Clamshell	Sugarcane bagasse, commercial compostable, heat tolerance up to 200 degrees F	Foodbizsupply 	\$157.45
	Biodegradable Shop 16oz hamburger container	Made of sugarcane, sturdy and strong, compostable, high oil/temperature resistance, microwave and freezer safe	Biodegradableshop 	\$138.33
	Natural Kraft Sandwich Bag	Grease resistant, biodegradable and compostable, microwave and freezer safe	BioMasspackagingstore 	\$23.68

Hamburger Bag:

The first two alternatives listed for the foil burger bag, the 6" solo bare hinged clamshell and the biodegradable shop 16oz hamburger container have the same structure of a small hinged box and are made of sugarcane, compostable, and heat resistant. We chose the latter as the best option because it was the most cost efficient. The third option we found has quite a different structure than the first two; it is not a box but rather a bag that does not fully close. While this product takes up less space and is also compostable, we did not feel that this was the best option because it was more expensive. Furthermore, the hinged clamshells appear more efficient at retaining heat and also more convenient for customers to grab and transport. The alternative reflects a 58.5% increase in cost for these products. However, converting these products would significantly decrease aluminum waste produced while still maintaining the same degree of customer satisfaction.

Product	Alternatives	Alternative Description	Distributor	Price/1000
Hot Dog Bag	NatureFlex 8.5" Clear Bag	Produced from plant based renewable resources; Grease, oil, chemical resistant; suitable for hot and cold foods, oven and microwavable safe; commercially and biodegradable compostable	BioMasspackagingstore 	\$102.69
	Staylock Hinged Plastic Hot Dog Container	Plastic #6, secure close, reusable	Webstaurant Store 	\$158.88

Hot Dog Bag:

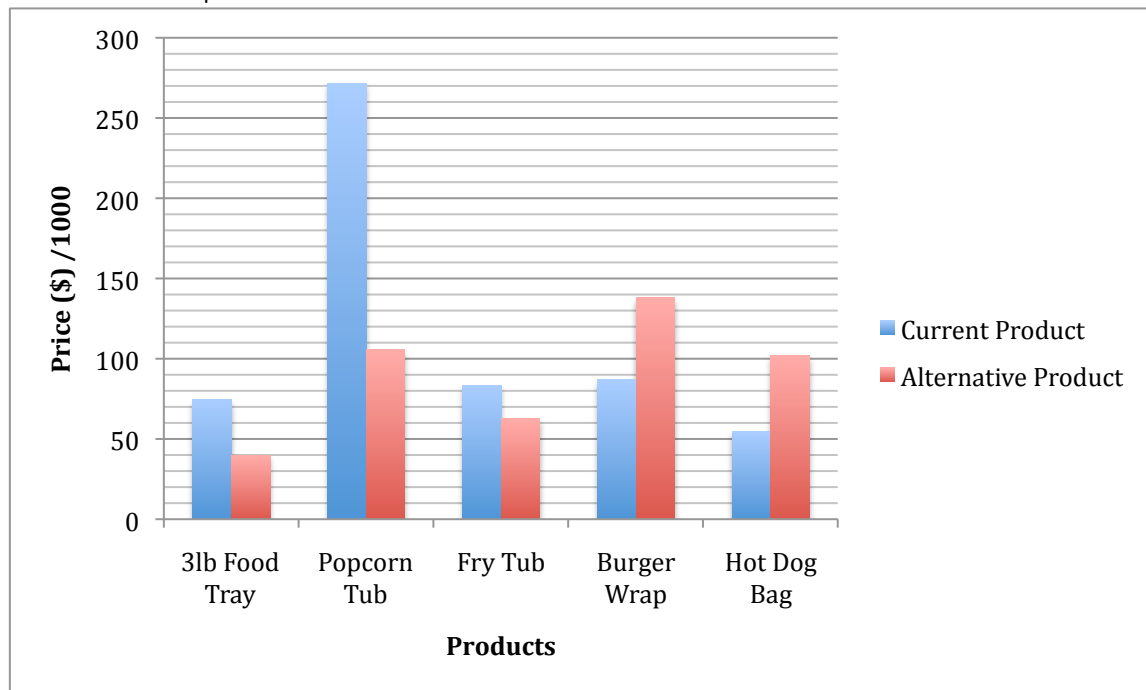
The aluminum hot dog bags were by far the most difficult product to find an alternative for. Hot dogs are one of the most used products in the stadium. The current product used to sell them in is a paper lined aluminum bag. Like the hamburger bags, because they are a combination of paper and aluminum, they cannot be recycled. The first product we found is manufactured by NatureFlex, is grease and oil resistant, and is designed for storing both cold and hot foods. The second alternative we found is a Staylock Hinged Plastic container. This is a suitable alternative to storing hotdogs, but the product is not compostable. However, it is #6 plastic and accepted by UVA recycling, offering a more eco-friendly option than the current product. Another difficulty with these alternatives is that they are more expensive than the product we use now, the cheaper alternative requiring an 86% increase in cost.

Price Comparison

Table 6: Price Comparison

Product	Current Cost/1000	Alternative Manufacturer	Alternative Cost/1000	Price Difference	Percent Change
3lb Food Tray	\$75.00	EcoCraft Natural Kraft	\$40.44	\$-34.56	46.1% decrease
Popcorn Tub 46oz	\$271.90	EcoCraft Natural Kraft	\$105.98	\$-165.92	61% decrease
Fry Cups	\$84.00	EcoCraft Natural Kraft	\$63.34	\$-20.66	24.6% decrease
Burger Wraps 16oz	\$87.25	Biodegradable Shop	\$138.33	\$+51.08	58.5% increase
Hot Dog Bags	\$55.22	NatureFlex	\$102.69	\$+47.47	86.0% increase

Chart 1: Price Comparison



These tables show that three out of the five products we evaluated offer a decrease in cost. All products maintain full customer satisfaction, divert waste from landfills, and ultimately decrease UVA's environmental impact.

Cost Analysis

Table 7: Cost Analysis

Product	Units Sold	Total Cost of Current	Total Cost of Alternative	Price Difference
Wing Trays	6,568	\$492.60	\$265.61	\$-226.99
Fry Cups	5,140	\$431.76	\$325.57	\$-106.19
Burger Bags	4,652	\$405.89	\$643.50	\$+237.61
Hot Dog Bags	24,974	\$1379.06	\$2564.58	\$+1185.52
Total		Total Price Difference		\$+1089.95

** **Units Sold** taken from Boegner and Badesch's 2010 report

This chart does not include data for the popcorn bags because we were unable to obtain information on units sold. However, the alternative product that we selected represents a significantly lower cost per 1000 units that is worthy of consideration. Below is an estimated cost analysis:

Popcorn Tub	5000**	\$1359.50	\$529.90	\$-829.60
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**Assuming total units sold is 5,000 units, approximately the same as fry cups and burger bags

With this data the Total Price Difference would decrease to **\$+260.35**

This data represents estimates for the Fall 2010 football season. However, to feasibly implement product conversion, a cost analysis must be completed encompassing concessions for all of UVA Athletic Departments. Because of corporate restrictions, we were unable to collect data for product volume of all of UVA concessions; however, we feel that the cost analysis we performed for Scott Stadium would produce similar results for other UVA athletic departments.

Other Cost Considerations

We were unable to obtain cost information specific to UVA for current use of the products below. To present a general idea of percent change in the cost of conversion of these products, we pulled together data from a single website. This data does not reflect the products currently used at UVA concessions but a general cost analysis of other alternative options.

Table 8: Other Alternatives

Product	Recyclable #6	Compostable	\$ Cost Difference	% Change
9 oz Plastic Cold Cup (Wine)	Dart Conex Clear PET Plastic Squat \$53.80/1000	Dart Conex Classic RE-PET Squat \$61.88/1000	\$8.08	15.22%
24 oz Plastic Cold Cup (Beer)	Dart Conex Clear PET Plastic \$53.32/600	Dart Conex Classic RE-PET \$61.31/600	\$7.99	14.98%
12 oz Paper Hot Cup (Coffee)	Solo White Paper Hot Cup \$56.99/1000	Solo Bare PLA Hot Cup \$79.99/1000	\$23.00	40.35%
Nacho Tray		BioPlanet Compostable Nacho Tray	N/A	N/A

****All data taken from www.webrestaurantstore.com**

TIMELINE

- September 9: Product description and group composition.
- September 12: Researched products for compostable/recyclable alternatives from Matt and Ashley's list.
- September 30: Contacted Black Bear Composting and Craig Croker regarding composting limitations and allowances.
- October 1: Emailed Matt and Ashley to discuss specific details regarding their previous experiences and gain insight on the process they went through concerning product conversion.
- October 2: Discovered composting companies can accept wider ranges of materials than previously expected, including: cardboard pizza boxes, wax-lined cups, and products containing grease. Biggest problem realized is that products that combine paper with plastic or paper with foil are most difficult to sustainably dispose of.
- October 5: Composed our conceptual design. Provided organization for progress we needed to attain.
- October 11: Emailed Kendall regarding cost of products. She directed us to talk to Eric. She also suggested looking at percentages of products rather actual quantities.
- October 14: Emailed Eric regarding product cost information and product volume information, but his access to this was limited.
- October 15: Emailed Rodney to set up a meeting.

- October 20: Group meeting researching products still needed for conversion, including alternative product life cycle (compostable/recyclable), conceptual costs, and pros and cons of converting. We also researched the requirements of compostable products for composting companies.
- October 31: Meeting with Rodney regarding product cost and volume. Learned that converting products requires us to encompass all factions of athletics, not exclusively football. Also learned product performance standards that UVA and Aramark maintain including: heat retention of hotdog/hamburger foil bags, grease absorption of popcorn tubs and fry cups, customer appeal of #7 recyclable souvenir cup, concession stand performance for all products. Learned that in the past year, plastic cutlery and napkins had been converted to compostable alternatives. Proved that Aramark is willing and open to conversion if cost efficient and maintains same standards.
- November 1- November 7: Revisited products needing conversion on a large-scale cost analysis. This included contacting vendors and manufacturers that supply alternative products and gaining product quantity info and cost.
- November 8- November 14: Researched what happens to compostable materials in solid waste landfill. With this info, determined if sending composting products to composting site is cost efficient.
- November 14- November 28: Amalgamated all product alternatives, performed extensive cost analysis, drafted charts on plastic alternative research, cost analysis, and price comparison. Completed final report.
- December 10: Final Report Due.

FUTURE WORK

While we feel we feel that we have contributed very useful and extensive research, we realize there is still much to be done before a complete product conversion can take place. We were not able to test products ourselves this semester, but we believe this could be a helpful assessment of product performance and comparability to current products. We could conduct experiments with both current and alternative products to evaluate their performance based on factors such as heat retention, transportability, grease resistance, and overall customer satisfaction.

Another crucial variable in order for this project to be successful is the establishment of a relationship with a composting company. While it is certainly preferable to have compostable products in landfills versus non-compostable products, it would be an inefficient use of money and resources if we did not see the conversion all the way through to the composting process. Black Bear Composting Company is a local and monetarily efficient resource that is more than willing to help us in our endeavors. We should utilize this convenience and establish a committed relationship with Black Bear in order to ensure this product conversion.

To fully seek out product conversion, the next step would be considering other vendors in Scott Stadium whose products are not supplied through Aramark. In our conversations with Griffin, he expressed that the waste produced from these vendors is minimal compared to that of the concession stands. Also, many of the products they use are already recyclable or compostable. Because of the vendor's small impact on waste produced at Scott Stadium, we did not take on this faction of product conversion this semester. However, in order to achieve Zero-Waste Football goal, it is definitely worthy of future consideration.

LESSONS LEARNED

There were many barriers we faced throughout the course of this product, both in our own research and through communications with community partners and collaborators. Initially, we had difficulty deciding which products to focus on. We realized we could not convert souvenir or fan cups; Griffin felt these were important commodities for fans to have because they are practical and visually appealing. While we were disappointed because they constitute a fairly large volume of waste produced, we understood this was non-negotiable.

On the other hand, we were pleased to find that some products had already been converted to compostable options, including cutlery and paper napkins. Others were already compostable, including paper cup holders, paper tray liners, and pizza boxes. The problem we face is that UVA football does not have a relationship with a composting company. The task regarding these products is to ensure they will be composted.

Another important issue throughout the conversion process is maintaining customer satisfaction. In our meeting with Griffin, while cost was certainly brought up as a factor, his greatest stress was placed on product performance. He made it clear that he did not want to deal with complaints regarding food quality or standards of service. We realized that in our research, it would be crucial to look for products that would not lower the quality of food being delivered to customers.

However, our most pressing challenge was obtaining specific information on the volume of products used per football season and the price of these products. This information was crucial to our research, as we wanted to perform a cost analysis and comparison on current products and new alternatives. Aramark can only release a certain amount of this confidential information, so for a decent period of time we were not sure how we would complete the cost analysis. During this time period, we considered other means to achieve this information. One was obtaining prices of similar products from stores such as Sam's Club and Costco, and another was determining the volume of various waste categories from the waste audit group. However, after speaking with Wegner, Boegner, and Badesch in relation to this challenge, we were able to obtain price estimates per 1000 units. Overall, we realized that while sometimes we might come across challenges with larger companies, determination and persistence are key qualities in achieving your goals.

CONCLUSION

Through our research and application we have compiled a list of products that can help divert waste from landfills and overall encourage a cost efficient cycle for the Universities programs. There are still questions left regarding if Aramark's department and the university can agree to convert to greater cost efficient products or if the customers' preferences will take precedence over the efficiency of the products. Our work has been measured by our research of why compostable and recyclable products are more efficient. Providing a cost analysis of the less expensive products, we have proven that alternative products will still enable the same customer satisfaction while drastically decreasing the overall expense of products, creating more sustainable practices that can encourage the university to grow in this direction. With this information we hope Aramark can look though and decide that the conversion of these products will be more efficient for them while still maintaining customer satisfaction. The products we decided to assess were determined by three main factors: cost, product performance, and overall environmental impact. These evaluations stemmed from the current Aramark products that couldn't be recycled or composted therefore contributing to overall waste being cultivated by Scotts Stadium. To finalize our research report these charts and graphs describing this process have been laid out in this project.

Bibliography

- Badesch, Ashley, and Matt Boegner. "Zero Waste Football." Dec. 2010: n. Print.
- "BIODEGRADABLE Products, Compostable GREEN Paper Products." Web. 11 Dec. 2011.
- "Biodegradable Shop." Web. 11 Dec. 2011.
- "Compostable & Biodegradable Foodservice Solutions | Biomass Packaging Store." Web. 11 Dec. 2011.
- Department of Waste Management. "Vegetative Waste Management and Yard Waste Composting Facility Regulations." Jan. 1998. Web.
- "Foodservicedirect.com Restaurant Supplies." Web. 11 Dec. 2011.
- "Get to Know Your Recyclable Plastics by Number - Planet Green." Web. 11 Dec. 2011.
- "Green Restaurant Supplies, Biodegradable Food Packaging & Compostable Products Food Service Supplier EcoFriendly." Web. 11 Dec. 2011.
- "Home." Web. 11 Dec. 2011.
- "Non-Hazardous Waste | Basic Information | Wastes | US EPA." Web. 11 Dec. 2011.
- "Plastics Recycling Section -- Recycler's World." Web. 11 Dec. 2011.
- "Recycling the Hard Stuff." July 2002. Web.
- "Restaurant Supplies, Restaurant Supply at The Webstaurant Store." Web. 11 Dec. 2011.
- "The Garden of Oz." Web. 11 Dec. 2011.
- "Virginia DEQ - Waste Management - Waste regulations." Web. 11 Dec. 2011.