SUSTAINABILITY INITIATIVES BY STUDENT ORGANIZATIONS FUNDING PROPOSAL

Part I - General Information

Name of Student Organization: Sustainable @ VT
Contact/Responsible Person: Amory Fischer, in collaboration with Neileen Shoemaker, Kyle Dost, Melinda Nash, Kelsey Hottel, and Katie Atkinson.
Contact Email Address: amoryhf@vt.edu
Contact Phone Number: 434-566-9338

Part II - Project Cost Information

Estimated cost of this proposal: $36,237.00 See Part III. C

Estimated Savings: See Part III. D
Three scenarios:
1.5% Reusable To-Go container use: $5,935.26 annually or $29,676.30 over five years.
5% Reusable To-Go container use: $19,943.75 annually or $59,831.26 over five years.
10% Reusable To-Go container use: $39,887.51 annually or $199,437.53 over five years.

Net cost of this proposal:
1.5% Reusable To-Go container use: $36,237.00 - $29,676.30 = $6,560.70 over five years.
5% Reusable To-Go container use: $36,237.00 - $59,831.26 = - $23,594.26 (**SAVINGS)** over five years.
10% Reusable To-Go container use: $36,237.00 - $199,437.53 = -$163,200.53 **(SAVINGS)** over five years.

Part III - Supporting Information

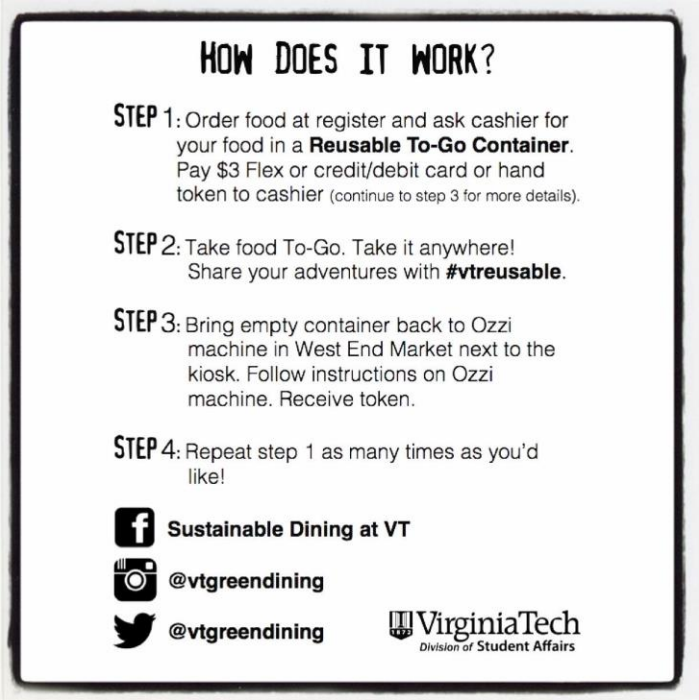
A. Please describe your sustainability initiative and attach supporting documentation.

Basics

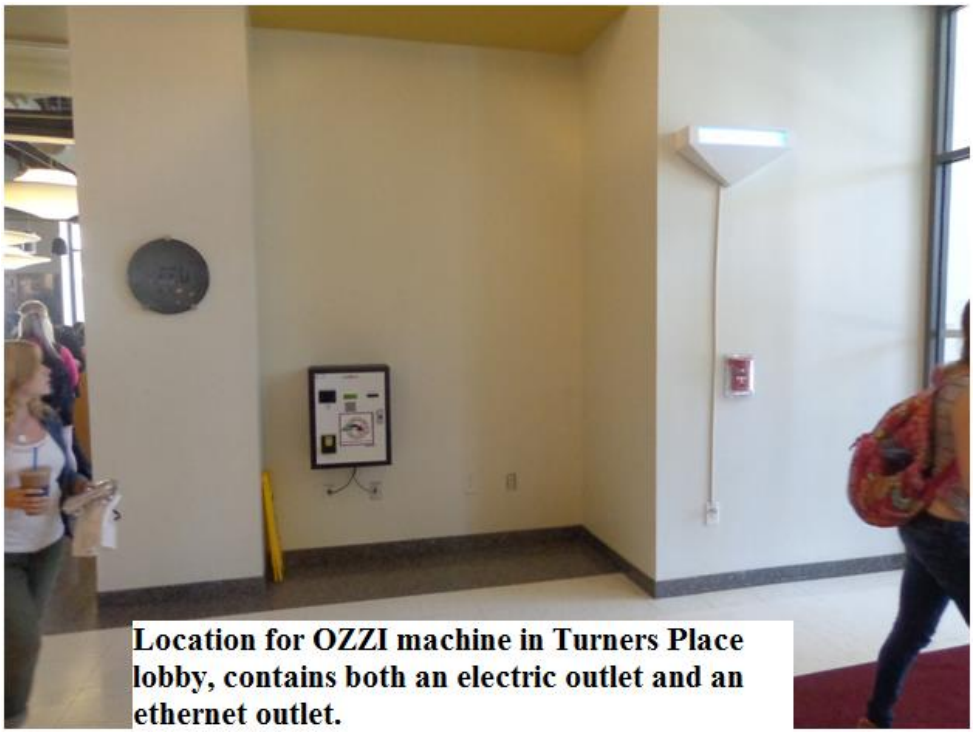
This initiative would expand the Reusable To-Go container program currently offered at West End Market to Owens Food Court, Turner Place, and add a drop off center at Squires Student Center. The purpose is to reduce the amount of single use disposable containers on campus, especially ones made of styrofoam.

The expansion requires the purchase of three OZZI machines manufactured by the company AGreenOZZI. More information along with the exact machine details can be found at: http://www.agreenozzi.com/. An image of the machine is listed.

The Current Process for the Reusable To-Go container is demonstrated visually in the video “How To: Reusable To Go Containers at Virginia Tech” (link listed below) and the steps can be found below.
Watch here: https://www.youtube.com/watch?v=8R2BkmMlKwo

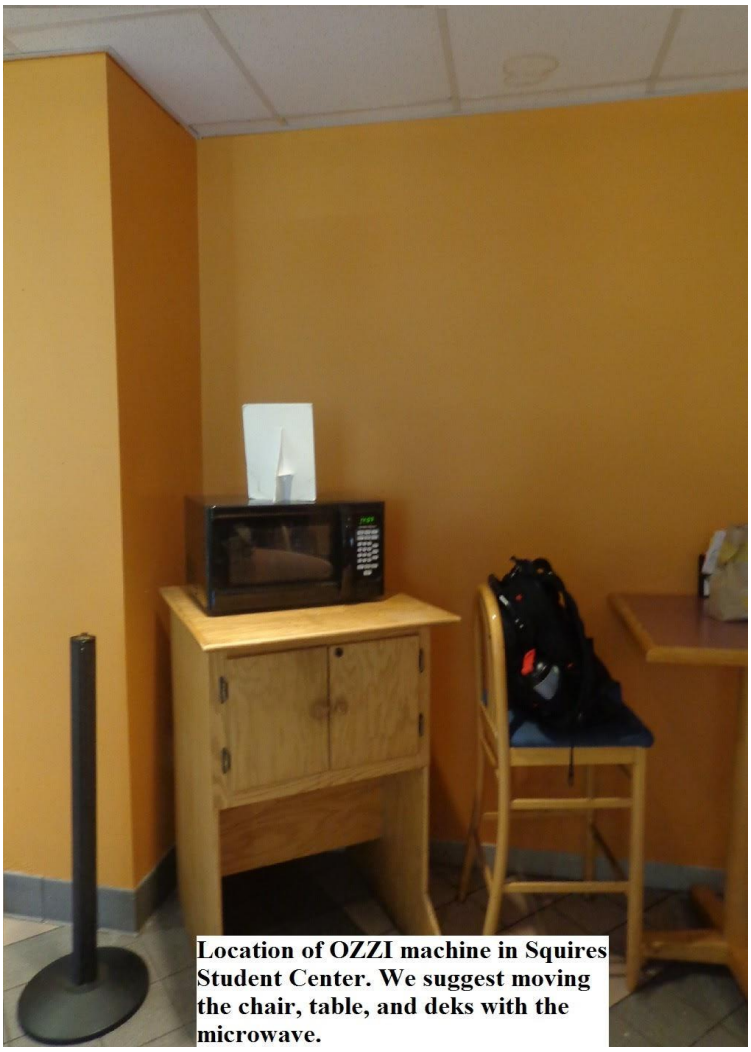


Each OZZI Machine requires space, an electrical outlet, and an ethernet outlet. Proposed locations meeting these standards are found below.



Location for OZZI machine in Turners Place lobby, contains both an electric outlet and an ethernet outlet.

Location for OZZI machine in Owens Food Court lobby, contains both an electrical and ethernet outlet.



Location of OZZI machine in Squires Student Center. We suggest moving the chair, table, and deks with the microwave.

NOTE: It has not been confirmed that there is an ethernet outlet in the location for the Squires Student Center. Therefore, a cable would need to be run to the machine from an ethernet outlet. If so 25ft cables at the bookstore are $9.99. This cost is not factored in to the overall cost.

Single-Use Containers and Virginia Tech

Virginia Tech Dining Services currently uses Styrofoam containers, but according to Rial Tombes, Sustainability Coordinator for Virginia Tech Dining Services, Dining Services plans to transition away from foam to-go containers within the next year. For that reason, only Compostable containers will be used as an example for this report.

Compostable containers cost between $0.25 - $0.30. The average weight of each container is roughly 1.5 ounces, or 0.093 lbs, but also varies depending on production dimensions and material (GenPak, 2014). The 1.5 ounce weight and the $0.30 cost will be used for calculations.

GenPak, 2014: "HF243 Product Information." *HF243*. N.p., n.d. Web. 05 Oct. 2014. Available from:
<http://www.genpak.com/product-info/HF243/>

Reusable To-Go Program supporting information

As noted in Part III D, the To-Go program has grown significantly since it began in Fall of 2013. Based on the first seven weeks of the Fall 2013 and Fall 2014 semesters, use has gone up 67.6% in that time (from 611 uses by 10/13/13 to 1024 uses by 10/13/14). At the end of the Spring 2014 semester, focus group discussions were led and a survey was conducted to gather student input on the program.

Expansion of the OZZI program has support from a large number of participants. Results from a focus group performed November 2013 show that placing an OZZI receptacle in other dining halls – such as Owens or Turner Place – would be another way to raise participation and awareness of the program. A survey conducted in May of this year indicated that students overwhelmingly want to be more sustainable and use less Styrofoam in dining halls, and many of the respondents specifically stated Owens dining hall for a possible expansion site. One respondent liked the idea of OZZI because the machine "would make returning the containers easier, especially since most people are always in a rush." Others have said that "it would be great to have the program in other dining halls," and that "universality in all dining halls" would also be effective. The surveys mentioned were conducted and provided by Rial Tombes, the Sustainability Coordinator for Dining Services at Virginia Tech.

Both the survey and the focus group results are attached as supporting documentation.

B. How does this initiative help to achieve the goals of the VT Climate Action Committee Resolution and Sustainability Plan?

Basics

The two aspects of the VT Climate Action Committee Resolution and Sustainability Plan that this RFP addresses are numbers 3 and 8 copied below.

"3. Virginia Tech will establish a target for reduction of campus GHG emissions to 80% below 1990 emission level of 188,000 tons by 2050. Interim targets from 2006 emissions of 316,000 tons will be: for 2012, 295,000 tons (on path to 2025 target); for 2025, 255,000 tons (2000 emission level); and for 2050, 38,000 tons (80% below 1990 emission level)."

"8. Virginia Tech will minimize waste and achieve a 50% recycle rate by 2020"

By reducing the number of single-use to go containers used on campus, Virginia Tech will minimize waste created on campus and reduce GHG emissions.

Please read the following "Ecological Impacts of Landfills," "Ecological Impacts of Plastic Trash," "Cubic Feet of Trash Reduced," "Footprint of a Styrofoam container," and "Footprint of a Compostable container" for more details on how reducing single-use containers advance sustainability on campus and works toward achieving the goals of the VT Climate Action Committee Resolution and Sustainability Plan.

Ecological Impacts of Landfills

Nearly 50% of waste produced in the United States today ultimately ends up in a landfill, 75% of which has the ability to be recycled or composted ("Waste and Recycling," n.d.). Much of the municipal solid waste residing in landfills, such as plastic and Styrofoam, have landfill lifespans lasting hundreds of years or more. Many ecological risks arise from the use of landfills as the primary waste management method. While there are many risks associated with disposal sites, the majority can be defined as atmospheric effects, hydrological effects and the resulting health effects.

Atmospheric impacts of landfills include Green House Gas emissions and particulate emissions. Over 90% of landfill gases are methane and carbon dioxide, the remaining 10% includes a mixture of various other gases (EPA, 2012). According to the EPA, the methane produced by trapping decomposing organic materials in landfills are 21 times more effective at trapping solar heat than carbon dioxide, contributing to climate change (EPA, 2012). The methane produced escapes the landfill through either diffusing through the soil or by escaping openly into the atmosphere. Methane is not only a damaging Green House Gas, but can also result in explosion and combustion. Non-chemical atmospheric effects result from the noise pollution as a result from landfill production and management, odor from the decomposing organic materials and particulate emissions such as dust being released into the atmosphere.

Disposal sites also pose hydrological risks. The primary risk is that of leachate. Leachate is the liquid that forms when landfill waste breaks down and water filters through it. Municipal solid waste leachate contains hazardous materials, such as VOC's. Leachate enters the groundwater environment, making aquifers and drinking water sources unusable.

Both of the resulting atmospheric and hydrological effects of landfills pose risks for human health. The leachate resulting from landfills can require costly clean up efforts to make water usable again. The landfill gases also pose potential health risks. The gases not only threaten safety as a result of fires and explosions, but the gases contain toxic compounds that may cause health issues such as respiratory issues, fatigue, and sleeping disorders. The ecological impacts of landfills continue to rapidly increase with the increase in consumption, and will continue to do so until proper action occurs. Reducing disposable To-Go containers would reduce trash in the landfill.

"Waste and Recycling." *Waste & Recycling: Living Sustainably: Indiana University Bloomington*. Indiana University, n.d. Web. 03 Oct. 2014.

"Municipal Solid Waste (MSW) in the United States: Facts and Figures." *EPA*. Environmental Protection Agency, 2012. Web. 01 Oct. 2014.

DGGT. "Toolkit Landfill Technology: Environmental Risks." Pp. 1-16. Web. 2009.

Ecological Impact of Plastic Trash

While some of the plastic trash in the oceans comes from commercial ships and fishing boats, 80% of it originates on land. Most everything that we eat, drink or use today has some kind of plastic in it- a material designed to last forever but used for products that we dispose of rather quickly. The problem with this is that plastic does not biodegrade. Plastic pollution has been increasing on a global scale, blocking waterways, damaging marine ecosystems and

entering the marine food web. In the ocean, some plastics such as polycarbonate and polystyrene sink, while LDPE, HDPE, polypropylene and foamed plastics float on the surface.

At sea, floating plastics are swept into slow moving currents called gyres. The North Pacific gyre spans an area that is roughly twice the size of the entire United States, constantly shifting in size and shape. The trash in this gyre will remain for decades or more. Although this is the largest one, there are five major oceanic gyres worldwide. As plastics circulate throughout the oceans, they absorb a variety of waterborne contaminants such as PCBs, DDT, and other pesticides, which can then be transferred to the marine life who mistakenly eat plastic pollution. 44% of all seabird species, 22% of cetaceans, all species of sea turtles, and a large amount of fish species have been documented with plastic in or around their bodies. When these plastics are consumed, they can lead to internal blockage, dehydration, starvation and death. This is concerning to the human population as well, as chemicals ingested by marine life can work their way up the food chain, potentially entering our bodies when we consume seafood.

Reducing the use of disposable To-Go containers would prevent Styrofoam trash from reaching the ocean.

"The Problem." *5 Gyres Understanding Plastic Pollution Through Exploration Education and Action*. 5 Gyres Institute, n.d. Web. 3 Oct. 2014.

Cubic feet of Trash Reduced

A typical disposable to-go container has the dimensions of 9.4 (L) by 9.0 (W) by 3.0 (H) in inches. These dimensions will be used to calculate the size of the trash reduced. The total volume of each container in cubic feet is ((9.4 x 9.0 x 3.0) x 0.00694444) = 1.7625 cubic feet. (Note: One cubic inch is equal to 0.00694444 cubic feet.)

To put that into perspective, a typical 53 foot semi truck has a capacity of 3800 cubic feet (Ship North America, 2013). The Reusable To-Go program currently prevents about 3 semi trucks of trash annually. (1.7625 cubic feet x 6593.75 containers / 3800 cubic feet per truck). Multiply that by three and one can see that the Reusable To-Go program could prevent almost nine semi trucks of trash annually! This is trash that would not make it to landfills or ocean gyres.

Ship North America. 2013. “Equipment -Truck, Truck Trailers, and Van Specifications.” Web. Oct. 7, 2014. Available from: http://www.shipnorthamerica.com/htmfiles/equipment.html

Footprint of a Compostable container

Polylactic acid (PLA) bioplastics require less energy and water to produce than Styrofoam, and releases less carbon dioxide during production (Making Bioplastics). Ultimately, compostable containers have the benefit of not lasting for 500 years. However, compostable containers cost more and still require waste disposal actions.

"Making Bioplastics (PLA)." *World Centric*. N.p., n.d. Web. 5 Oct. 2014. <http%3A%2F%2Fwww.worldcentric.org%2Fsustainability%2Fmanufacturing%2FPLA>.

C. What is the cost of your proposal? Please describe in adequate detail the basis for your cost estimate.

Three OZZI machines would cost $36,000 (Each machine costs $11,999.00). Maintenance costs will be roughly $100 per machine per year. Dining Services would cover this annual cost.

Each OZZI requires ethernet access. There is a $80 fee for activating ethernet in the Dining Halls. So each machine would have an $80 fee in addition to the purchasing cost.

When the OZZI machine was installed in West End Market, it took dining hall staff less than 30 minutes. Because of this, labor costs are not factored in with this RFP (Tombes, 2014).

Total cost: ($11,999.00 x 3) + ($80.00 x 3) = $36,327.00

D. Are there cost savings for the University? If so, how much? Please describe in adequate detail the basis for your savings estimate.

The data below shows the September participation numbers for the Reusable To-Go program for 2013 and 2014. It was supplied from Virginia Tech's Dining Service's Sustainability Coordinator Rial Tombes.

By 10/13/13 (7 weeks into the semester):
Total Enrolled in RTG program: 149
Number of returned containers 611

By 10/13/14(7 weeks into the semester):
Total Enrolled in RTG program: 192
Number of returned containers to Ozzi Machine: 1024

Previous success in Reusable To-Go container program as precedent for future success and Dining Services goals for the program: From 2013 to 2014, Virginia Tech saw a 67.6% increase in the use of the containers (1024-611)/611 due to increased awareness of the program, the ease of the OZZI machine system, and reduction in cost. Between the start of the semester and October 13, 2014, a total of 103,000 to-go meals were served. With 1,024 of those meals being served in a Reusable To-Go Container, just under 1% of to-go meals at West End Market are being served in the Reusable To-Go Containers. West End Market would like to see this percentage increase to between 3 and 5% before the end of the 14 -15 academic year (Tombes, 2014).

Scenario method explanation:

In each scenario, two factors are included, the **cost reduction of buying single use to-go containers** and the **cost reduction of waste disposa**l. Each ton of trash costs the University $53. Pounds are converted into tons and multiplied by $53.

In September of 2014, West End market had 62,500 to-go transactions (Bill Hess, 2014). Currently, the Reusable To-Go container program at West End accounts for about 1.5% of those to-go transactions, or 930 for the month and an average of 31 per day (Bill Hess, 2014).

The school year has, counting weekends and excluding Thanksgiving, Winter, and Spring breaks (August + September 37, October 31, November 22, December 17, January 11, February 28, March 22, April 30, May 13) 211 days total.

So to project the 2014-2015 school year, West End Market is projected to eliminate the use of 31 per day x 211 days = 6541 to-go containers through the Reusable To-Go program. The estimated savings from this one OZZI machine are calculated under **2014-2015 estimate for one OZZI**.

If the program were expanded, there would be a total of 4 OZZI machines. We infer that we get a similar increase in savings with each additional OZZI machine for the **Projection Estimate for three additional OZZI**. This extrapolation of the September 2014 to-go usage is multiplied by three to get the projected effect on the program by buying more OZZI machines.

Three scenarios are analyzed: one at the current usage rate of 1.5%, one at a projected rate of 5% and one at a projected rate of 10%. A ten percent usage rate would not be unreasonable according to Bill Hess of Dining Services.

Cost Saving Scenarios for three additional OZZI machines using the 0.093 lb (1.5 ounce) $0.30 compostable containers:

For three additional machines: 62,500 (total to-go transactions at West End Market in September 2014) **multiplied by** the Reusable To-Go container usage percentage (1.5%, 5%, and 10%) **divided by** 30 (number of days in September) **multiplied by** 211 (days in the school year) **multiplied by** 3 (three new machines) = The number of single-use to-go containers prevented in each scenario.

1.5%: (19,623 x 3 x $0.30) + (((19,623 x 0.093)/2000 lbs) x $53) = $5,935.26 annually or $29,676.30 over five years.

5%: (65,938 x $0.30) + (((65,938 x 0.093 lbs)/2000 lbs) x53) = $19,943.75 annually or $59,831.26 over five years.

10%: (131,875 x $0.30) + (((131,875 x 0.093 lbs)/2000 lbs) x53) = $39,887.51 annually or $199,437.53 over five years.

E. Is this funding request an Ongoing or One-Time change **(please check one)?**

X **One-time** ☐ **Ongoing**

F. Is funding available for this request from another source? If yes, describe the funding source and amount.

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Coca-cola gave $6,000 for the purchase of the the first OZZI machine through their Sustainability Fund. They may be interested in assisting in this endeavor again.

SUSTAINABILITY INITIATIVES BY STUDENT ORGANIZATIONS FUNDING PROPOSAL

Part IV - Requestors/Reviewers

Prepared By (Name of Contact for Student Organization)
Date 10/24/2014

Reviewed By (Name of Appropriate University Official)
William Hess
Date 10/24/14

Reviewed By (Name of Office of Energy and Sustainability Representative)
Date