

THE UNIVERSITY OF BRITISH COLUMBIA FOOD SYSTEM PROJECT

*Scenario 1: Climate Action Partnership
Contribution of Food GHG Emissions Reduction: Moving UBC Beyond Climate
Neutral*

Agricultural Sciences 450
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April 10, 2009

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ABSTRACT

The UBC Food System Project (UBCFSP) is a community-based action research project that involves numerous partners. The aim of the project is to increase the sustainability of the UBC food system. We, group 2, were assigned the specific task of assessing emission reductions and climate action targets outlined by the UBC Climate Action Partnership (CAP). Our team chose to evaluate the following target: Ensure that 90% of UBC's food system waste can be composted or recycled by 2015. We reviewed previous AGSC 450 findings, various academic databases on climate change and current initiatives at UBC as well as other universities. We communicated with stakeholders from the UBC Sustainability Office, UBC Waste Management, UBC Food Services and the AMS Food and Beverage Department through interviews and emails. We conducted visits to Caffé Perugia and the Student Union building and went on a tour of the in-vessel composting facility. We determined that increasing the efficiency of composting and decreasing contamination in compost bins throughout the campus would have a positive effect on reducing GHG emissions. In order to realize these benefits, we generated a series of composting best practices and building layout and design guidelines for the new Student Union Building (SUB). We hope the SUB can be used as a pilot project for a compost strategy that can be generalized to the rest of campus. We further came up with recommendations for future AGSC 450 classes, stakeholders and fellow collaborators to help move UBC toward and *beyond* climate neutral by 2010.

INTRODUCTION

The UBCFSP is a collaborative community-based action research project that began in 2002 and is an integral part of the AGSC 450: Land, Food and Community III course. The project aims to improve the social, ecological and economic sustainability of the UBC food

system. The UBCFSP involves partnerships with UBC Food Services (UBCFS), AMS Food and Beverage Department (AMSFBD), UBC Waste Management (UBCWM), Centre for Sustainable Food Systems at UBC Farm, UBC Campus and Community Planning, Sauder School of Business classes, UBC Sage Bistro, UBC Sustainability Office (SO) and its Social, Ecological, Economic, Development Studies (SEEDS) program, and the Faculty of Land and Food Systems (Rojas, 2009).

For the 2009 component of the UBCFSP, our group was assigned to the climate action partnership scenario, which addresses the contribution of food greenhouse gas (GHG) emissions on campus and aims to move UBC toward and *beyond* climate neutral. The central research question for this paper is: can increased composting efficiency lead to a reduction in GHG emissions within the UBC food system? Our goal is to identify composting best practices that can be used to develop design and layout guidelines for the new Student Union Building (SUB) that can be adapted and applied to other buildings on campus. This paper is divided into six main sections: first a definition of the GHG emissions problem, second an evaluation of the vision statement, third a description of the methodology, fourth an assessment of the chosen target, fifth a discussion of our findings and lastly recommendations to various stakeholders.

PROBLEM DEFINITION

Over the last three decades GHG emissions have increased at an alarming rate with carbon dioxide, methane and nitrous oxide being the main contributors to climate change (Cohen & Hopwood, 1998). At the current rate of production we will be faced with irreversible consequences such as rising sea levels, severe floods and droughts, melting of glaciers and changing weather patterns (IPCC, 2007). All of which have negative long-term effects on natural ecosystems, agriculture and human health (Cohen & Hopwood, 1998).

The Government of British Columbia has taken an aggressive approach in turning GHG reduction targets into law. According to the Greenhouse Gas Reduction Targets Act, which was implemented in November 2007, it is “legally required for all provincial public sector organizations to be carbon-neutral by 2010” (Penner, 2007). Thus, public sectors such as health institutions, school districts and post-secondary institutions must report and reduce their GHG emissions. Remaining GHG emissions are to be offset by investing in research, technology, or projects that will help to reach carbon-neutrality (Penner, 2007).

As a provincial public sector institution, UBC is required to take the appropriate steps to achieve the carbon-neutral goal. Over the last ten years, UBC has already shown climate action initiative through programs such as ECOTrek, Canada’s largest university energy and water retrofit and the UBC U-Pass transit ridership program, which has resulted in yearly GHG emission reductions of approximately 16,000 tonnes (Easton & Ferris, 2008).

On March 13th, 2008, UBC, along with five other Canadian universities, signed the University and College President’s Climate Change Statement of Action for Canada. In this statement UBC acknowledged the significance of global climate change and agreed to take action to move UBC *beyond* climate neutral, through collaboration, innovation and sharing. In an attempt to achieve this objective, in 2007, the UBC Sustainability Office created the Climate Action Partnership (CAP). It is hoped that CAP will succeed in developing a Climate Action Framework that will include a plan for achieving a carbon neutral food system at UBC (Adams et al, 2008).

The 2008 UBCFSP directed students to develop a series of GHG emission reduction targets that focus on UBC’s food system. We have been given the task of evaluating one or more of these targets based on its feasibility, appropriateness and community support. We

selected the following target: **Ensure that 90% of UBC's food system waste stream can be composted or recycled by 2015.** We felt that this target was straight forward, well defined and could provide a meaningful contribution to UBC's CAP objectives.

VISION STATEMENT

Our group discussed the seven guiding principles that shape the 2009 UBCFSP Vision Statement (see Appendix A). The principles were helpful in determining the focus of our project; however, we found some of them to be problematic when specifically placed in the context of climate neutrality.

Our group members agreed with the food security, education, awareness and community components of the statement. The promotion of local foods aligned with our values; yet, we felt that this principle should include a definition of "local." All of us believe that in terms of GHG emissions, a balance must be achieved between localized food production and sustainability. For instance, the use of local food may not cut down emissions if it is produced in an unsustainable manner. Two of our group members, in particular, felt strongly that reducing food miles is a small component of achieving climate neutrality in the UBC food system.

We struggled with idea that food should be "produced by socially, ecologically conscious producers" and that these "providers and growers pay and receive fair prices." These statements seem somewhat idealistic. We felt that the economic component was not adequately addressed as achieving these principles would require a reworking of the current capitalist growth-oriented system.

The principle that calls for waste to be "recycled or composted locally" is the most relevant to our project. Our group was fairly divided on this subject. Several of us questioned whether an increase in recycling and composting would in fact reduce GHG emissions at UBC.

Some of the considerations were: the release of methane from composting, the energy used in recycling, the emissions from trucks required to pick up bins, as well as where and how compostable containers and cutlery are produced. Despite our differing views, we felt that if these issues could be addressed adequately and combined with a reduction in waste production, then increased composting and recycling could help move the campus beyond climate neutrality.

IDENTIFICATION OF VALUE ASSUMPTIONS

Our team is composed of diverse students majoring in different programs in the Faculty of Land and Food Systems. This fact enabled us to approach our task from a wide range of angles providing a more complete evaluation of the GHG emissions problem at UBC. Despite our diverse backgrounds, we primarily identify with a weak-anthropocentric paradigm. Based on this view, we believe that human survival is linked to the health of the environment. Hence, the protection and preservation of the natural environment through a reduction of GHG emissions is in our best interest.

METHODOLOGY

In assessing the feasibility, appropriateness and community support of our target, we investigated ways of increasing the diversion of food service outlet waste from the traditional waste stream into compost. We also researched ways of improving the efficiency of composting operations by reducing contamination in compost bins.

We conducted interviews with stakeholders in order to understand their goals for composting, as well as the barriers and challenges they face trying to reach these goals. We interviewed UBC Waste Management Outreach Coordinators, Sara Orchard and Christian Beaudrie, who also took us on a tour of the in-vessel composter. In addition, we spoke with

Caffé Perugia's Supervisor Josie Midha in order to understand how a successful composting program runs at UBC. As well, we met with Carolina Guimaraes, AMS Sustainability Strategy Coordinator to better understand how composting works at the SUB, and where further improvements can be made. These interviews provided us with an opportunity to engage with stakeholders and evaluate the feasibility, support, and logistics of our proposed target.

Interview data was supplemented by research from both primary and secondary sources including scholarly articles, previous AGSC 450 student papers and the 2008 year-end UBC CAP Summary. We built upon the research of past AGSC 450 groups and also looked at what other campuses in North America are doing to reduce their food GHG emission. In doing so, we gained a better understanding of the complexities associated with achieving climate neutrality. All of this research was then used to assess our target and provide recommendations for the future.

FINDINGS & DISCUSSION

CLIMATE CHANGE IN THE CONTEXT OF THE NATIONAL AND GLOBAL FOOD SYSTEMS

Food systems contribute to global warming by releasing GHG emissions at its various stages, including: agricultural and livestock production, transportation, food storage, processing, packaging and waste (Adams et al, 2008).

The Food Climate Research Network estimates that 17-32% of GHGs emitted globally are attributable to agricultural activities (AGSC 450 Group 21, 2008) and in 2003 Canada's agricultural sector was responsible for 8.4% of its total GHG emissions (Environment Canada, 2007; AGSC 450 Group 21, 2008).

The relationship between food systems and climate change is complicated by the direct and indirect effects climate change will have on global food security, particularly food

production and availability, stability of food supplies, utilization, accessibility and affordability (Schmidhuber & Tubiello, 2007). Climate change will also result in changes in temperature and precipitation that will have negative impacts on land's agricultural suitability as well as the ability to produce healthy crops (Schmidhuber & Tubiello, 2007). The predicted variability in global weather conditions is expected to increase the frequency and severity of severe weather events such as cyclones, floods and droughts, which will cause wider variation in crop yields, exacerbating problems of hunger and disease, particularly in developing countries where populations are already vulnerable (Schmidhuber & Tubiello, 2007). Climate change will alter food safety as well as disease pressure from vector, water and food-borne diseases (Schmidhuber & Tubiello, 2007).

As this paper is primarily concerned with GHG emissions originating from waste, it should be noted that in 2005, approximately 3.7% of Canada's total GHG emissions resulted from the waste sector (Environment Canada, 2007; AGSC 450 Group 21, 2008). According to the International Alliance Against Hunger, an estimated 33-50% of all food shipped to leading developed countries is wasted, which creates unnecessary GHG emissions from the production, distribution, processing and storage of food (AGSC 450 Group 21, 2008).

Food waste that is sent to the landfill is decomposed by anaerobic bacteria and produces methane and CO₂ in approximately equal proportions (Ayalon et al., 2001). The resulting CO₂ is part of the natural carbon cycle; however, the methane produced from this process registers as a net increase on GHG inventories (Adams et al., 2008). Methane is a potent GHG, yet landfill methane emissions (from food waste) can be effectively avoided through composting (Ayalon et al., 2001). Research conducted by UBC's Waste Management estimates that every percent increase of discarded food successfully redirected to a composter, will result in a 4.6

megatonne reduction of carbon emissions (as cited in Adams et al., 2008). Since methane from landfills accounts for 89% of the emissions from solid waste disposal on land in Canada (Environment Canada, 2007) increasing composting operations on a national and global scale may be an effective way of reducing waste stream GHG emissions.

LINKAGE: CLIMATE CHANGE AND THE UBC FOOD SYSTEM

UBC is a miniature city and thus manifests many of the same issues and challenges that connect climate change and food systems at the national and global levels. The UBC food system contributes to climate change through various energy intensive activities such as food purchasing patterns, food transportation, food storage, processing and disposal. The UBC Sustainability Office estimates that 0.05 tonnes of CO₂ per square meter of space are emitted each year from core academic buildings as a result of heating, lighting and electricity. Fertilizer use and application for the same year totaled 149 tonnes of associated CO₂ and waste emissions were estimated at 1,065 tonnes of CO₂ (UBCSO, 2008).

While UBC has attempted to incorporate food system emissions into its GHG inventory, there remains significant difficulty in quantifying emissions associated with food procurement practices as well as production and processing techniques. For this reason, UBC has classified these emissions as “third scope” emissions, that is, emissions that lie outside of UBC’s technical boundary of responsibility (UBCSO, 2008).

UBC Food Services, the AMS and other food providers in and around campus will be vulnerable to price volatility in food commodity markets as seen in global and national food systems. Food production and availability will continue to be more uncertain as a result of climate change (Schmidhuber & Tubiello, 2007). It is less likely that the UBC population will fall victim to hunger and widespread disease as a result of climate change, since these issues

are more likely to manifest in developing countries that lack a comprehensive food safety system and medical infrastructure as found in Canada (Schmidhuber & Tubiello, 2007).

The UBC food system parallels the national and global food systems in being waste intensive. For example, the US Environmental Protection Agency notes that waste in the form of disposable containers and packaging represents 33.1% of the solid waste by volume in the USA food system (Lang & Heasman, 2004), whereas UBC is estimated to have 40% of its landfill waste comprising of disposable containers (UBCWM, 2008). These high levels of disposable waste encompass energy and fuel consumption at various stages such as production, distribution and disposal to landfills. In addition to disposable containers, organic matter in landfills produces significant levels of methane, which links local, national and global food systems that rely on landfill disposal (United States Environmental Protection Agency, 2009).

LINKAGE: WHAT OTHER INSTITUTIONS ARE DOING

Many academic institutions in North America have recognized the importance of creating a more sustainable campus through climate neutrality; however, food system emissions are often omitted from their GHG inventories, as they are difficult to measure and quantify. Despite this fact many institutions still aim to decrease their carbon footprint by encouraging practices such as purchasing local foods, growing food on campus, creating edible landscapes, establishing recycling and composting programs, purchasing biodegradable containers and napkins, and moving towards more energy-efficient equipment. The following is a list schools that have made great strides towards reducing GHG emissions in their food systems:

- **Bates College** (Maine) – In 2008, Bates opened the New Dining Commons, which is "green" in many ways. Energy consumption is reduced through the use of recycled and

certified-green building materials, occupancy sensors, dual-flush toilets and natural air ventilation. Moreover, Bates has also developed a program where students are able to remove mugs and dishes from the dining halls and return them to other outlets on campus. (Bates, 2009)

- **Duke University** (North Carolina) – Duke is one of the few institutions to have conducted a comprehensive inventory of the environmental impact of the university’s dining facilities including GHG emissions. Duke has used this inventory to establish and implement environmental best practices. For instance, Duke’s dining services spends over one-third of their annual budget on local food, and campus eateries are evaluated annually on sustainability efforts. (Duke, 2009)
- **University of California Davis** – The Davis campus is home to the R4 (Reduce, Reuse, Recycle, Rebuy) program. R4 plays a supportive and informational role and also facilitates interactions between various campus stakeholders. R4 has partnered with Sodexho, the major food supplier on campus to organize “Zero Waste Events” and works to educate students, faculty and staff about the rewards of participating in recycling/composting programs. R4 has developed unique marketing methods such as the use of the word “landfill” instead of “garbage” to label trash bins on campus. (UC, 2009)

Many of the initiatives at these institutions could be applied at UBC to help reduce food system GHG emissions. It is important that UBC develop creative solutions to the large problem of global climate change. The establishment of an overarching waste/composting program that could coordinate efforts between various campus units would help UBC achieve its mission of moving *beyond* climate neutral.

REVISING THE TARGET

Based on our research, we determined that the target set by the CAP Summary Report to “ensure that 90% of UBC’s food system waste stream can be composted or recycled by 2015” (Adams et al., 2008) is unfeasible. We identified two main barriers to increasing composting on campus and thus achieving this target.

First, Christian Beaudrie, UBC Waste Management Outreach Coordinator, stated that the capacity of the in-vessel compost unit could accommodate a maximum of 70% of the current campus food waste stream (personal communication, March 5, 2009). Moreover, Beaudrie noted that the in-vessel compost unit would near capacity once composting services began for the new developments in South Campus.

Second, expanding the current in-vessel compost unit is cost-prohibitive. Beaudrie claimed that although increased levels of composting would result in marginal cost savings per unit of compost; these gains in efficiency would quickly become overwhelmed due to the costs of increased labour and waste sorting machinery (personal communication, March 5, 2009).

Given this information, we felt that our target required revision and it would be useful to look at ways to make current composting more efficient. Currently, contamination levels in organic bins and sporadic collection of these bins results in some of the compostable items being returned to the traditional waste stream. Thus, our new target is as follows: **Increase the efficiency of campus food waste composting to achieve the in-vessel capacity of 5 tonnes of organic waste per day.**

Our revised target seeks to use the new SUB (which is currently in the planning stages) as a pilot project for a composting strategy that can be generalized to the rest of campus. This strategy is composed of two components:

- A set of composting best practices guidelines
- A set of building design and layout guidelines that will facilitate composting

Our group's decision to focus on the new SUB as a pilot project was motivated by three reasons, 1) the new SUB presents an opportunity to incorporate building and design considerations in a way that facilitates composting and waste sorting, 2) the construction provides the opportunity to potentially rework contracts and provide greater ownership of composting operations, and 3) the SUB's central role in student life may help develop positive attitudes towards composting.

COMPOST STRATEGY: BEST PRACTICES

The following guidelines represent the findings from stakeholder engagement, review of work by previous AGSC 450 students and an interview involving a successful composting case study at Caffé Perugia.

Program Leadership & Support

Our investigations into composting operations at Caffé Perugia and the SUB revealed the importance of top-down responsibility for composting operations as well as the need for program support from staff or volunteers. Both facilities have required strong central responsibility in order to develop their respective compost programs. The compost program in the SUB differs from Caffé Perugia however, since the program managers Toogood and Guimaraes are volunteers with limited available volunteer hours, and they lack the staff support that is available to the supervisor of Caffé Perugia (Midha, personal communication, March 18, 2009). Caffé Perugia benefits from staff that educate customers about composting as well help move the compost bins to the loading bay (Midha, personal communication, March 18, 2009). This scenario suggests that the new SUB will require a larger volunteer base and/or the creation

of a part-time or full-time position to oversee and manage expanded composting operations in the new facility.

Staff Training

Staff training is important as it provides staff with the knowledge to support composting initiatives. Midha trains all of her staff to be familiar with compostable and non-compostable items. For example, smoothie cups are compostable, but the straws are not. With this information, staff are able to actively engage customers by showing them proper sorting and composting techniques (Midha, personal communication, March 18, 2009). Training food service employees figured in the CAP 2008 Summary Report and will be an important step to facilitating customer engagement (see below) in the new SUB.

Customer Engagement

Midha emphasized the need for staff to speak with customers and to educate customers about the composting program and the significance of compostable containers (personal communication, March 18, 2009). Educating consumers on basic facts like the price compostable cutlery was stressed, as well as the fact Caffé Perugia has absorbed these costs as opposed to increasing menu prices. According to Midha, this knowledge sensitizes customers as to the effort made by the establishment and encourages customers to go the extra mile and compost (personal communication, March 18, 2009). Midha sees persistent customer engagement as the central factor behind the gradual changes in composting attitudes and behavior at Caffé Perugia (personal communication, March 18, 2009). This experience suggests that the new SUB should employ persistent customer engagement in order to increase compost volume and quality.

Comprehensive Marketing Campaign

Previous AGSC 450 groups have investigated means of increasing compost promotional material as part of a compost marketing campaign. This material addresses key barriers to composting such as laziness, insufficient awareness, inability to understand personal connection and lack of incentive (UBCSO, First Year and Graduate, 2005). Utilizing this promotional material will help expand the compost program in the new SUB. This promotional material may include: an informational brochure that is meant to accompany compost bins (AGSC 450 Group 17, 2006); a series of posters, stickers and pamphlets that can serve as prompts and reminders to compost (AGSC 450 Group 5, 2006); a composting incentive campaign such as Get Caught Composting that seeks to reward composting as a positive behavior (AGSC 450 Group 2, 2006). Other marketing directions may include making use of the AMS-owned television screens next to Blue Chip Cookies to feature weekly or monthly ‘Compost Factoids’ where compostable items are shown and proper waste sorting is encouraged (Guimaraes, personal communication, March 17, 2009).

COMPOST STRATEGY: BUILDING DESIGN & LAYOUT

User Friendly Bin-Placement; “Bin-quads”

Bins should be easily accessible to staff (Midha, personal communication, March 18, 2009) as well as customers (AGSC 450 Group 17, 2006). In 2006, Group 2 noted that garbage cans in the current SUB are much more prevalent as compared with compost bins, which makes compost bins less accessible and less convenient to use. One way to get around this problem is to group different bin types together with garbage bins accompanied by compost, recyclable and paper forming “bin-quads” (AGSC 450 Group 17, 2006).

Layout and Design: Bin Spatial Allocation; Bin-quads, a Scalable Model

Our group observed bin placements in the current SUB and noted that while there were some bin groupings (including compost bins) certain areas simply lacked sufficient space in

order to place bin-quads. Allowing sufficient space for bin groupings along corridors, or inseting bins into the wall stretches could potentially avoid these spatial constraints.

Central disposal areas in crowded cafeterias or loungers may consider using a scaled up version of the bin-quad model in order to facilitate convenience through "one-stop-disposal", such as the model as employed by 99 Chairs and Place Vanier. The Vanier model was noted as particularly effective, as the presence of a dishwasher meant that customers going to return dishes follow a predictable traffic pattern that can be used to plan a convenient waste sorting and disposal station (AGSC 450 Group 2, 2006).

ANALYSIS: COMPOST STRATEGY - FEASIBILITY

Since our compost strategy is concerned with changing behavioral patterns as well as attitudes towards composting, it is essentially an effort in Community-based Social Marketing (CSM). As such, we use a series of CSM criteria in order to infer the effectiveness of our strategy. These criteria categories include: prompts, norms, communication, incentives and convenience (TFCISE 2001). We feel our compost strategy suitably addresses each of these areas.

Prompts

Prompts are an important part to any CSM campaign, as they provide a reminder to perform a desired behavior (TFCISE, 2001). Our best practice guidelines provide a range of composting prompts, such as customer education, posters, brochures, buttons, stickers, and other promotional material recommend as part of a compost marketing strategy. Future compost marketing initiatives such as “composting factoids” should follow the CSM guidelines utilized in our marketing material, and be noticeable, brightly colored, eye-catching, self-explanatory, and close to the compost bins (TFCISE, 2001).

Norms

Our composting strategy emphasizes the leadership role of supervisors and staff. Leading by example helps establish composting as a normal behavior, which may entice others to mimic it (TFCISE, 2001). As noted by Group 17 (2006), promotional material will also help establish composting as a norm, and make others believe composting is the correct thing to do; a similar extrapolation can be made regarding our building design guidelines, and help legitimize composting as a normal behavior.

Communication

Our best practices emphasize customer engagement and face-to-face interaction, which has been shown to be an effective marketing technique (Read, 1999). As mentioned previously, the promotional material we recommend as part of our marketing campaign has been developed in accordance with CSM principles (such as being self-explanatory and noticeable), which will facilitate effective communication.

Incentives

Since composting has low participation incentives (TFCISE, 2001), our composting strategy attempts to fill this gap. Particularly, we advocate the promotion and development of the Get Caught Composting campaign in the new SUB; a campaign that provides recognition for individuals “caught” composting through free promotional material such as pins and stickers (AGSC 450 Group 2, 2006). We also encourage the use of the composting “draw” proposed by Group 17 (2006), which intends to raise interest and awareness about composting and features a ‘compost skill testing question’ prior to collecting a prize.

Convenience

The more convenient an activity, the more likely people will participate in the activity (TFCISE, 2001). Allocating space effectively and providing additional bin-quad groupings will

make waste sorting and disposal more convenient because people will not have to go to multiple locations in order to sort waste.

ANALYSIS: COMPOST STRATEGY - APPROPRIATENESS

Ultimately, it is important that our target contribute towards reduced GHG emissions. While evidence suggests that composting is an effective means of reducing GHG emissions (Ayalon, Avnimelech, & Shechter, 2001), there is still uncertainty as to the actual net reductions achieved through UBC's in-vessel composting operations, as there have been no efforts to quantify this reduction (Adams et al., 2008). Another area of uncertainty involves cost effectiveness: input from stakeholders suggests that the incremental costs of labor and capital are prohibitive at very high levels of compost diversion (Beaudrie, personal communication, March 5, 2009). However, other sources assert that composting is an economical and cost effective way of reducing GHG emissions—with costs around \$10 per ton of CO₂e reductions (Ayalon et al., 2001). Further research is required to clarify these issues and to better understand the appropriateness of composting of campus.

Stakeholders expressed concern over the focus of our target, asserting that it places excessive emphasis on diversion as opposed to source reduction (Guimaraes, personal communication, March 17, 2009). According to Guimaraes, more emphasis should be placed on using reusable cutlery and plates as opposed to disposable or even recyclable items (personal communication, March 17, 2009); there is still considerable uncertainty whether these new compostable items actually embody a net reduction in GHG emissions, and some items are imported from Hong Kong (Adams et al., 2008).

ANALYSIS: COMPOST STRATEGY – COMMUNITY SUPPORT

Community support was established for certain aspects of our compost strategy and revised target, but other areas still require further investigation. For instance, Beaudrie expressed his support for expanding capacity the in-vessel composting unit, and then bringing the expanded unit to its full operational capacity (personal communication, March 5, 2009). However, community support must still be assessed for the technical application of our composting strategy in the new SUB. For instance, the support of a few enthusiastic individuals was registered, particularly Toogood and Guimaraes, but these individuals by themselves do not have the time or resources to implement our compost strategy. Also, additional stakeholders need to be consulted in order to establish their support of our strategy, especially food service staff in the current SUB.

Interviews with Waste Management demonstrated that while they are supportive of climate-neutral initiatives there are also barriers to this support (Beaudrie, personal communication, April 1, 2009). Strict union contracts limit the extent that Waste Management can engage in new activities (Guimaraes, personal communication, March 17, 2009).

Our group submitted our building and design guidelines to the planning committee for the new SUB; yet again, it was difficult to measure the impact of this effort. We utilized an online submission form that did not provide an opportunity to assess support or interest from these recommendations. We feel a more substantive level of coordination will be required to realize design and layout considerations that facilitate waste sorting and composting in the new SUB.

ANALYSIS: COMPOST STRATEGY – BARRIERS

One of the biggest barriers to implementing our compost strategy is a lack of funds. Previous investigations have revealed that Waste Management does not have sufficient funds for full time employees to manage new programs (AGSC 450 Group 17, 2006), which would be required to implement our compost strategy.

It is unlikely that funds will be forthcoming from the University either, as waste stream emissions are classified as discretionary Third Scope emissions under UBC's GHG inventory guidelines. As long as waste stream emissions remain discretionary, the University faces little incentive to invest in activities like a compost strategy for the new SUB. Funding remains a significant barrier to the implementation of our compost strategy, and it may fall to future AGSC 450 groups to investigate funding sources, or restrict future GHG reduction initiatives in the waste sector to volunteer-based and very cost effective strategies.

One of the main tenants of our best practice guidelines is customer education and communication. Midha suggested that the high proportion of staff relative to supervisors in the SUB could present barriers to effective staff training, and negatively affect effective communication between staff and customers (personal communication, March 19, 2009). On another note, previous year's AGSC 450 groups observed that some food service staff currently working in the SUB have poor English skills (AGSC 450 Group 30, 2008), a factor that may complicate effective customer education and limit the impact of this component of our composting strategy.

RECOMMENDATIONS FOR FUTURE AGSC GROUPS

Short Term: AGSC 450: 2010-2011

- ***Contact food service outlets with “Best Practices” solutions to decreasing compost contamination***
 - Important focus: facilitate customer engagement to increase compost volume and quality
 - Future AGSC 450 groups could offer to provide short composting workshops at staff training events and could work with managerial staff to integrate composting awareness into standard training
- ***Coordinate with new SUB planners to ensure building design facilitates waste sorting and composting***
 - Important focus: “bin-quad facilities” and strategic allocation of bin space
 - The “Program” (sub renewal process) is looking to integrate building design into future student course content; this may be an ideal opportunity for AGSC 450 students
- ***Investigate funding sources to implement our Compost Strategy in the new SUB***
 - Important focus: cost effective ways of increasing composting on campus
 - Create an increased volunteer base and/or a part-time or full-time position to oversee and manage composting operations in the new facility

Long Term: Beyond AGSC 450: 2010

- ***Investigate costs of expanding the in-vessel composting unit***
 - Facilitate grant proposals by drafting letters

- Estimate overall compost system costs running composter at expanded full capacity
- ***Work with Waste Management and the Compost facility to maximize efficiency and reduce current costs of labor (specifically relating to education initiatives)***
 - Create an upper division 'Directed Studies' course for which a student can obtain credit for working with Waste Management to design and implement education initiatives
 - Implement an AGSC 450 scenario in which students are given the opportunity to work with Waste Management outreach coordinators to develop and implement education initiatives
 - Integrate, into the AGSC 100 service-learning curriculum, the option to volunteer with the Waste Management promotional department
- ***Establish a baseline estimate of the quantity of Co2 energy averted via composting***
 - This task would require joint efforts among a number of parties, not limited to Agsci 450 students, Waste Management, composting staff, and possible external consultation companies.

CONCLUSION

After carrying out extensive research pertaining to composting and its potential to reduce GHG emissions, we believe that increasing the efficiency of composting on UBC campus will be a positive step towards achieving climate neutrality. Through our research, we concluded that the initial target of ensuring 90% of UBC's food system waste be composted or recycled by 2015 was infeasible. Instead, our group strongly believes that increased efforts should be made to improve current composting practices on campus in order to increase

efficiency and reduce contamination. An excellent opportunity for a pilot project to launch these efforts lies in the new SUB, where best practices and consumer social marketing can be used to improve consumers' composting behaviour. Significant barriers still exist, including costs and lack of data due to the complexities of measuring emission reductions through composting. Our group recommends that further research be conducted in order to overcome these barriers and help bring UBC closer to reaching its goal of climate neutrality.

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APPENDIX A

Vision Statement for a Sustainable UBC Food System

The overarching goal of a sustainable food system is to protect and enhance the diversity and quality of the ecosystem and to improve social equity, whereby:

1. Food is locally grown, produced and processed.
2. Waste must be recycled or composted locally
3. Food is ethnically diverse, affordable, safe and nutritious
4. Providers and educators promote awareness among consumers about cultivation, processing, ingredients and nutrition
5. Food brings people together and enhances community
6. Is produced by socially, ecologically conscious producers
7. Providers and growers pay and receive fair prices