

**Climate Action Partnership. Contribution of Food Greenhouse Gas Emissions Reductions: Moving UBC
Beyond Climate Neutral**

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Climate Action Partnership Contribution of Food GHG Emissions Reductions: Moving UBC Beyond Climate Neutral

A Look at the Impact of Composting at the Student
Union Building

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I. ABSTRACT

In recognition of the contribution of food greenhouse gas (GHG) emissions to global warming, UBC has taken initiatives to reduce GHG emissions with the goal of moving beyond climate neutral. As a group, we have examined this problem in the context of our global food system and looked at UBC's role as one of the leading institutions in sustainability initiatives in North America. Our methodology included examining past scenario papers, literature review, looking at the UBC Climate Action Partnership paper, the SUB waste audit, an interview with Nancy Toogood, AMS Food and Beverage Manager, and performing a SUB Student Composting Awareness Survey. From our findings, we concluded that educating students about composting and the impact of composting in the context of climate change are critical steps towards increasing composting initiatives and reducing GHG emissions. As such, we then developed a set of four Composting Awareness Posters to be placed in the SUB for awareness and educational purposes. This paper will provide details about our research and recommendations for future AGSC 450 students to further this project in the years to come and help move UBC beyond climate neutral.

II. INTRODUCTION

A poll conducted by the University of British Columbia (UBC) revealed that four out of five Canadians feel that reducing GHG emissions and the effects of global warming should be a top environmental priority for the government (UBC poll shows Canadians feel greenhouse gas, global warming top environmental concerns, 2002).

Climate change is an issue that has been gaining much publicity and is a great concern to many. Some of the more obvious signs of climate change are retreating glaciers, melting ice caps, increasing incidences of natural disasters, and reduced air quality. One of the main factors contributing to this change in climate and global warming is the build up of GHG in the atmosphere, in which increasing levels of carbon dioxide (CO₂) have been a primary contributing factor (Halweil, 2003). The food system is a major source of GHG emissions due to transportation and processing (Halweil, 2003). On average, food travels approximately 2,500 to 4,000 km, with the two main means of transport as airplanes and trucks, which also happen to be the two with the highest CO₂ emissions (Halweil, 2003 and IPCC, 2007). Furthermore, food waste is a major component of waste material at landfills (MJ Waste Solutions, 2009). Every tonne of this waste material at landfills generates about 3 tonnes of CO₂ emissions (MJ Waste Solutions, 2009), which then makes a huge impact on the total amount of CO₂ gas produced globally.

UBC emits roughly 145,000 tonnes of CO₂ annually through operations and transit of staff and students to and from UBC (UBCFSP Scenario 1, 2009). To investigate this problem, the UBC Food System Project (UBCFSP), a community-based action research project, was initiated in 2002 by the Faculty of Land and Food Systems in collaboration with many key branches of UBC, including UBC Food Services (UBCFSS), AMS Food and Beverage Department (AMSFBD), UBC Waste Management (UBCWMM), Centre for Sustainable Food Systems at UBC Farm, UBC Campus and Community Planning, Sauder School of Business, UBC Sage Bistro, UBC Sustainability Office (SO), and UBCSO's Social, Ecological, Economic, Development Studies (SEEDS) program.

As part of the UBCFSP, we will investigate areas contributing to UBC's current GHG emissions and subsequently how to reduce emissions and its impact on the environment. In response to the recommendations made by last year's colleagues involved in the UBCFSP, we decided to focus our research on addressing the linkages between composting and the reducing GHG emissions. In particular, we hope to examine the issue of student initiatives of composting at the Student Union Building (SUB) and their impact on the reduction of GHG emissions and moving UBC beyond climate neutral. By doing so, we hope to fill in the information gap identified by previous groups involved in this project and help in the evolution of this ecology of knowledge.

In this paper, we will first define the problem in the context of our global food system, look at UBC's role as a leader in sustainability initiatives in North America, and reflect upon the vision statements provided by our AGSC 450 instructors. We will then proceed to talk about our research methodology and discuss our findings. We conclude with recommendations for future AGSC 450 students to carry on this project in the years to come.

III. PROBLEM DEFINITION

Climate change is a pressing global issue because it can have devastating effects on the ecosystem, global economy, and quality of life. As mentioned before, one of the main factors contributing to climate change is the emission of GHG from various sources, with the food system as one of the major sources (Halweil, 2003). The food system emits GHG through numerous channels including agriculture, food transportation, food processing, and waste production. Food transportation in particular makes up for majority

of the food GHG emissions because of its extensive reliance on the use of aircrafts and trucks, which are the two modes of transport with the highest GHG emissions (UBCFSP Scenario 1, 2009).

Slowing climate change is an international challenge. Despite this, various governments and institutions are making initiatives to overcome the barriers. For example, the Government of British Columbia has mandated a carbon neutral action plan: Bill 44: GHG Reduction Targets Act, in response to increasing GHG emissions. The purpose of this bill is to set a target for public sectors such as universities like UBC, to become carbon neutral by 2010 (Penner, 2007). In order to qualify as carbon neutral, the net emission of GHG must be zero (Allyn, Byland, Formigoni, Gosset, Holmes, Timoshouk, & Zach, 2008). In response to this policy, Simon Fraser University (SFU) has started the Local Food Project aimed at introducing more local foods to the SFU Burnaby campus (Sustainable SFU, 2008). Meanwhile, universities elsewhere such as the University of Santa Cruz and University of Manitoba have also taken their own steps towards sustainability by committing their food outlets to serve only food grown within 250 miles of their university (UC Santa Cruz, 2004) and researching a new method of agriculture requiring zero tillage which would reduce energy use as well as GHG emissions (University of Manitoba, 2005).

As a leading institution in sustainability in North America, UBC has also launched numerous projects to reduce carbon emissions. A prime example of this is the Ecotrek program, which faced major renovations of nearly 300 academic buildings and other infrastructures in order to reduce water and energy usage (UBC Ecotrek program, 2006). Through the Ecotrek program, UBC campus successfully saved core campus energy by

20% (UBCFSP Scenario 1, 2009). To further cement itself as a leader in sustainability, UBC created North America's first Sustainability Office which later launched the Climate Action Partnership (CAP) in 2007 (UBCFSP Scenario 1, 2009). The focus of the CAP was to take the goal set by the provincial government to the next step by moving UBC *beyond* carbon neutral (UBC Sustainability, 2009). This involves the collaboration of students, faculty and staff in creating solutions to reduce GHG emissions resulting from transportation and campus operations (UBC Sustainability, 2009).

In support of the CAP and as students, we feel that we have closer ties to UBC's food system as opposed to other administrative functions involving GHG production; for this reason we will specifically investigate the food system and its relations to climate change. Furthermore, due to time constraints of this project, and along with the fact that the food system's impact on GHG emissions is multi-factorial (including: food production, transportation, processing, waste, etc.), we decided to focus our UBCFSP specifically on waste reduction and composting initiatives at the Student Union Building in UBC. We feel that composting is significant because proper composting has shown to help reduce waste and lower CO₂ emissions, which in turn reduces GHG emissions (Michell, 2005). Through this project, we hope to find out more about composting initiatives at the SUB and their overall impacts on waste reduction and GHG emissions reduction at the UBC campus. We anticipate that this assessment will help us identify areas of improvement regarding composting initiatives and help carry out recommendations in hopes of moving UBC beyond climate neutral.

IV. VISION STATEMENT

Upon reflecting on the seven principles of the vision statement provided by our AGSC 450 instructors, our group came together to share our thoughts on the principles. While most of us agree that these principles are good objectives and targets from an ecological and industrial perspective, we find that to meet all the stated principles simultaneously may be challenging and unrealistic. Our group feels that some adjustments need to be made in order to make these goals more attainable and reach an ideal and sustainable UBC food system.

1. Food is locally grown, produced and processed (as much as possible)

This statement hinges on the definition of local: if local is as Andrew Parr described (as local as possible) then this vision would be very feasible. However, if local is to be defined to be grown on campus, our group has doubts about the practicality of this statement as UBC would most likely be compelled to resort to purchasing majority of food elsewhere.

2. Waste must be recycled or composted locally

We feel strongly that increasing awareness and providing education about the need to compost as well as the proper way to recycle and compost are important in achieving this goal. Since UBC has an in-vessel compost, this would help reduce the amount of carbon dioxide emissions from transportation, since the waste now does not need to be delivered to Cache Creek Landfill, which is 1200 km away.

3. Food is ethnically diverse, affordable, safe and nutritious

We feel that this vision contradicts with the first and last visions because at this time, it may not be viable to grow all ethnically diverse foods locally due to restrictions in climate. Also affordability of food varies by income and thus nutritious food may not be affordable for everyone in B.C. (MacDonald, personal communication, March 31, 2009).

4. Providers and educators promote awareness among consumers about cultivation, processing, ingredients and nutrition

Our group believes that the focus on promoting awareness should come before education, in order to create a sense of responsibility amongst students and the public about their food and health. For us as students, we can do our part by helping to increase awareness on the UBC campus.

5. Food brings people together and enhances community

Our group agrees that food is nourishing and enjoyable in a social setting. It is important to realize that food is more than something to eat; it also brings people and communities together, promotes social well-being and helps to define our culture.

6. Is produced by socially, ecologically conscious producers

There is a movement towards this principle but we feel that profit is still the main driving force behind production. There is a need to strive for a balance between being socially and ecologically responsible while being profitable at the same time because food services need to be profitable in order to be self-sustainable in the long run.

7. Providers and growers pay and receive fair prices

Our group had disagreements regarding this principle because as with fair trade coffee, even though there are people who are willing to pay more for it, there are also others who are not. But if vision 4 can be achieved, and the awareness on the connection between good health and nutritious food has been spread to the consumers, we believe more people will be willing to pay for better food.

V. METHODOLOGY

We started working on our UBCFSP by reviewing the scenario write-ups provided by our AGSC 450 project instructor and collaborators. Our initial focus was on last year's (2008) AGSC 450 Scenario 1 final reports and literature review to increase our understanding of carbon footprint, climate change, and GHG emissions. We divided up this initial literature research based on the questions provided at the end of our scenario, which included topics such as: the importance of climate change and GHG emissions, the link between climate change and our global food system, linkages between climate change and wider food systems at UBC, and a review of other (if any) campuses action on becoming climate neutral.

After our initial research, we reviewed "UBC Climate Action Partnership: The UBC Food System and Greenhouse Gas Emissions," which was a compilation of 2008's Scenario 1 papers. From the recommendations section of this paper, we decided to focus on the "Marketing and Awareness Campaigns," specifically on the topic of increasing awareness amongst students in the Student Union Building (SUB) about composting and how composting relates to climate change.

We then proceeded to review AMS's Lighter Footprint Strategy and interviewed Nancy Toogood, AMS Food and Beverage Manager, to first determine if there was a need for our marketing campaign. Through her, we managed to get in contact with Carolina Guimaraes, AMS Sustainability Strategy Coordinator, to obtain a waste audit of the SUB in order to find out more about the success of composting at the SUB. We then proceeded to consult Nancy about the possible methods of marketing, for example: whether to conduct surveys, what media of marketing is suitable for our audiences (i.e.: posters, emails, etc.), and if we were to make posters, where we should place the posters. She provided her ideas and suggestions but told us to think about what would appeal to us as students as a possible effective marketing strategy. After much discussion with Nancy and as a group on our own, we decided to develop a set of questionnaires to survey the students at the SUB about their knowledge of composting. As an incentive for completing the survey, we handed each student a candy and a small information sheet about composting and climate change (see Appendix 1 and 2). Our group dispersed in the SUB, including the main floor and basement area to perform random sampling to represent the population of students using the SUB facilities. Because both the survey and information sheet were short, we felt that students may be willing to take that extra few minutes to complete the survey and read the information sheet. In this way, we can get an idea of students' level of knowledge regarding composting, and inform them about composting and climate change at the same time.

To further raise awareness about composting and climate change, we also decided to develop a set of four posters to be placed in bathroom stalls in the SUB. The poster will demonstrate the link between composting and climate change, increase awareness and

encourage students to compost. We feel that posters placed in bathroom stalls usually have a higher tendency to be noticed and read by students because of the ‘idle’ time in washrooms. Nancy mentioned that AMS has an agreement with Zoom Media, who is in charge of advertisements in bathroom stalls, to have a certain number of advertisements used by AMS. Hence, it is possible that our poster might be displayed in bathroom stalls in the SUB over the next year. We decided not to have our posters put up at the AMS food outlets at the SUB because Nancy mentioned that the number of posters present at the outlets was becoming an issue (in terms of sustainability) for customers.

VI. FINDINGS AND DISCUSSION

FINDINGS

The UBC Student Union Building Background, Key Stakeholders, and Carbon Footprint

The UBC Vancouver campus serves up to 44,982 students and 13,622 faculty and staff (UBC Public Affairs, 2008), with the SUB being one of the primary locations for students, faculty, and staff to congregate. The SUB is home to over 15 food outlets managed by the two food service providers on the UBC campus: the AMS Food and Beverage Department (AMSFBD) and UBC Food Services (UBCFS) (Toogood, personal communication, Mar 4, 2009). UBCFS has food service outlets located all over the UBC campus including the SUB, while AMSFBD outlets are located solely within the SUB (Allyn et al., 2008). The food outlets at the SUB, together with numerous students, faculty and staff, generate about 96 kilograms of disposed waste each day, with about 32 kilograms as pre-consumer waste and 64 kilograms as post-consumer waste (MJ Waste Solutions, 2009). With the great volume of students, faculty, staff, and food service

outlets, waste management at the SUB has a vital impact on UBC's plan in moving beyond climate neutral.

Andrew Parr, manager of UBCFS, indicated that UBCFS has moved sustainability issues and climate neutrality to their top priorities in recent years (Allyn et al., 2008). AMSFS has also adopted climate neutral practices and is committed to reducing their carbon footprint (Toogood, personal communication, Mar 4, 2009). Both food service providers have made changes to help reduce waste and GHG emissions as part of their plan in reducing UBC's carbon footprint. For example, the increase in recycling and composting bins at the SUB has been made possible by both UBCFS and AMSFBD (Toogood, personal communication, Mar 4, 2009). Even though UBCFS and AMSFBD own and manage their waste and compost bins separately, the solid waste is collected as a whole by MJ Waste Solutions (Toogood, personal communication, Mar 4, 2009).

Focusing on solid waste reduction from landfills is vital in moving UBC beyond carbon neutral because the diversion of solid waste from landfills helps reduce about 3 tonnes of CO₂ emissions for every tonne of material recycled (MJ Waste Solutions, 2009). On the other hand, every tonne of material in the landfill contributes about 3 tonnes of CO₂ emissions (MJ Waste Solutions, 2009). Through recycling and composting activities, MJ Waste Solutions estimated that AMS is presently creating a "net savings of 603 tonnes of CO₂ emissions" (MJ Waste Solutions, 2009).

AMS's Lighter Footprint Strategy in Relation to Reducing Carbon Emissions

The AMS is the student society of UBC, and the society's mission is to improve the quality of the educational, social, and personal lives of the students (AMS Lighter

Footprint Strategy, 2008). The AMS represents more than 44,000 UBC-Vancouver students and operates student services, student owned-businesses, resource groups and clubs around the campus.

In an effort to attain an ecological future, AMS passed an Environmental Sustainability Policy in January 2007. With goals to become an active leader in reducing the university's ecological footprint to more sustainable levels, UBC is promoting sustainability practices along with the university community and broader society (AMS Lighter Footprint Strategy, 2008).

According to the Global Footprint Network, humanity's Estimated Ecological Footprint (EF) is now over 23% higher than what is sustainable, and more than half of our EF is due to GHG emissions (Global Footprint Network, 2007). The Lighter Footprint Strategy created by AMS is derived from the concept of EF. Dr. William Rees and Mathis Wackernagel, from UBC, developed a technique called Ecological Footprint Analysis that measures how much fertile land a number of people require to produce the resources they consume and absorb the waste they produce (AMS Lighter Footprint Strategy, 2008). This technique allows AMS to use both qualitative and quantitative methods to measure the EF of the targets around the campus. The targets can be divided into 2 types: 1) internal target, and 2) interactive target. Internal targets are objectives that can be carried out by AMS without the help from other parties, whereas interactive targets are those requiring interactions with other cooperation such as UBC administration, TransLink, the City of Vancouver, or student organizations at other universities (AMS Lighter Footprint Strategy, 2008). The ecological impact of each target can then be categorized as low, moderate, high, or very high based on the principles of EF. This strategy has been one of

AMS’s most important environmental achievements in helping reduce emission by 16,000 tonnes per year around the UBC campus (AMS Lighter Footprint Strategy, 2008).

The UBC SUB Waste Audit

A study on waste was conducted on February 12, 2008 by MJ Waste Solutions in partnership with AMS Sustainability Strategy Coordinator, Carolina Guimaraes. Through this study, it was found that some of the primary components of the solid waste stream were: compostable food waste (39%), other plastics (13%), plastic film (13%), office paper (10%), compostable cutlery/dishes (10%), other paper (5%), beverage containers (3%), textiles (2%), fines (2%), coffee cups (2%) and chopsticks (2%) (See Figure 1) (MJ Waste Solutions, 2009). Compostable food waste, dishes and cutlery represented almost half (49%) of all waste disposed at the SUB.

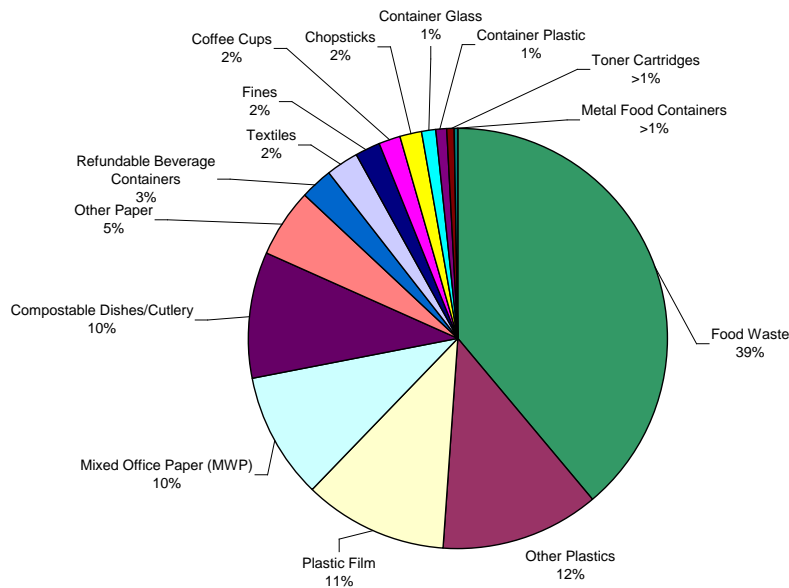


Figure 1: SUB Waste Composition—MJ Waste Solutions, Feb 2009

In particular, when looking at post-consumer waste, the primary components of solid stream waste were: compostable food waste (46%), other plastics (13%), and compostable cutlery/dishes (12%) (MJ Waste Solutions, 2009). Compostable items, including food wastes and compostable cutlery/dishes, make up the largest part of post-consumer solid waste stream, contributing to 58% of waste disposed (Figure 2) (MJ Waste Solutions, 2009).

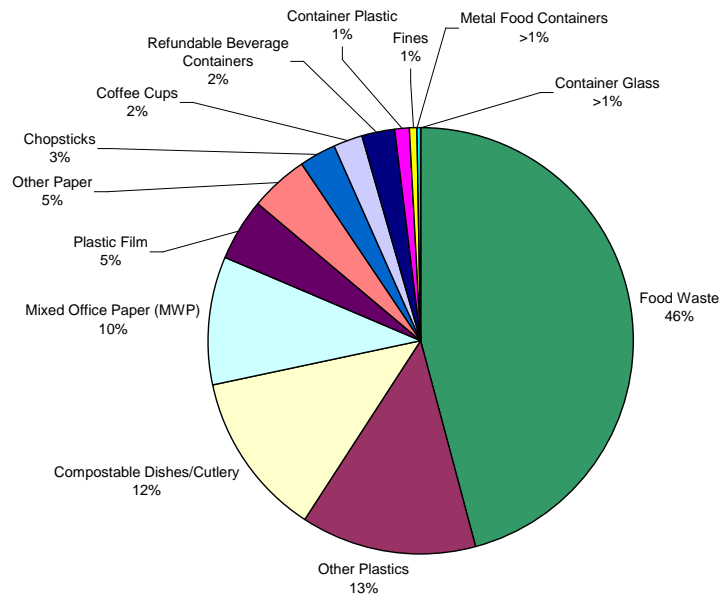


Figure 2: SUB Post-Consumer Waste Composition—MJ Waste Solutions, Feb 2009

To improve waste reduction at the SUB, MJ Waste Solutions proposed a few recommendations, one of which was to develop a communications program to the student body. In particular, they suggested updating signs at recycling stations, developing new handouts with pictograms about what can or cannot be recycled or composted, and developing and distributing informational posters (MJ Waste Solutions, 2009).

The SUB Student Composting Awareness Survey: Assessing Students' Level of Knowledge and Awareness about Composting

Since compostables represent such a huge component of solid waste stream at the SUB, especially in post-consumer solid waste, addressing this issue by targeting social marketing at the consumer level could potentially help reduce solid waste at the SUB and reduce GHG emissions. To address this issue, we conducted a student survey at the SUB to assess their level of awareness about composting in order to determine the appropriate approach (i.e.: to raise awareness about composting *or* to focus on educating about *why* and *how to* compost) to help increase composting at the SUB and reduce solid waste at the same time (see Appendix 2).

We approached a total of 80 students during lunchtime at the SUB hoping to obtain a diverse survey group. We found that out of these 80 students, 82% were aware of the presence of compost bins in the SUB (Figure 3).

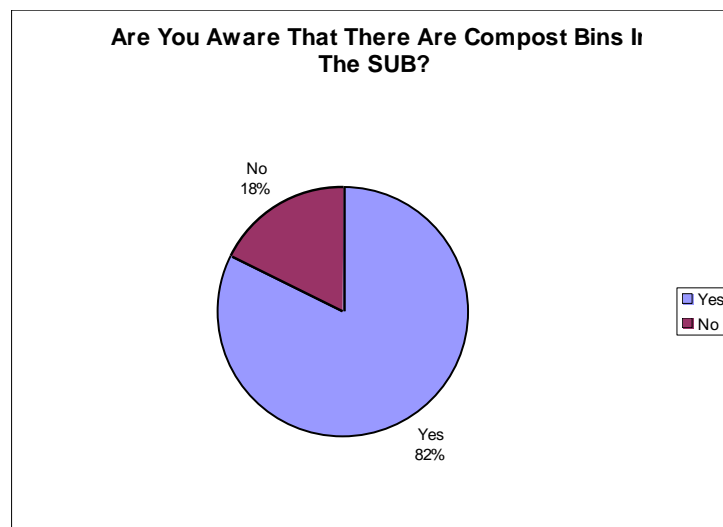


Figure 3: Students' Awareness of Compost Bins in the SUB

However, when asked how often they composted, 51% answered 'sometimes,' 11% answered 'always,' 25% answered 'often,' while 13% answered 'never' (Figure 4).

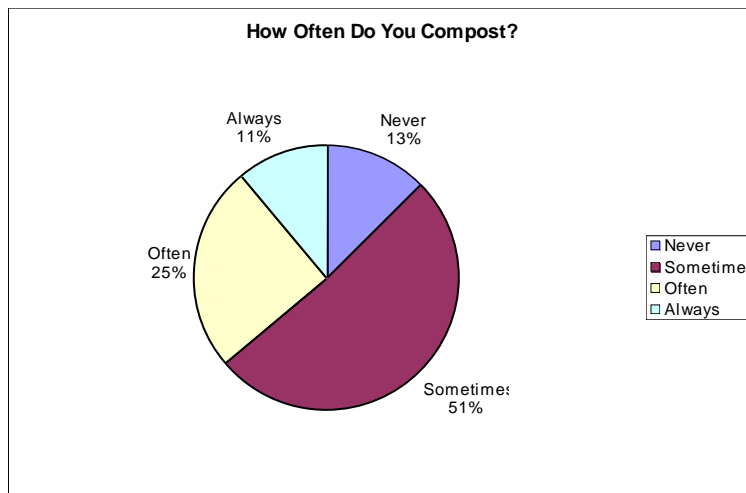


Figure 4: How Often Students Composted

In addition, the answers to the other survey questions are as follows:

- What composting is: 70% chose the right answer, 30% chose the wrong option.
- What percentage of waste is organic matter that can be composted: 40% chose the right answer, 60% chose the wrong option.
- What percentage of waste produced at food services outlets is made up of disposable containers: 29.49% out of those who answered chose the right answer (2 students did not answer this question).
- What items can be composted: 79.75% out of those who answered chose the right answer (1 student did not answer this question).
- What happens when compost is contaminated: 63% chose the right answer and 36.25% chose the wrong option.

DISCUSSION

Since the initiation of the UBCFSP in 2002, there have been significant changes made towards becoming a more sustainable community and reducing carbon emissions at UBC (Adams et al., 2008). Through our research we found that composting can potentially play a crucial role in helping UBC move beyond climate neutral by reducing the contribution of food GHG emissions. In our discussion we will focus mainly on AMS's Lighter Footprint Strategy in relation to reducing carbon emissions, the implications of the UBC SUB waste audit, the results of the Composting Awareness Survey, and the development of Composting Awareness Posters, in addition to some of the barriers we have identified through the course of our project.

AMS's Lighter Footprint Strategy in Relation to Reducing Carbon Emissions

The AMS created internal and interactive targets in order to determine which sectors around campus have the greatest ecological impact on the environment. Within these 2 types of targets, 9 different categories are sub-divided, with 3 of them belonging to 'internal' and the rest to 'interactive'. The 3 internal categories are: 1) food & beverage, 2) materials, and 3) communications, and the 6 interactive categories are 1) food & beverage, 2) building materials, 3) building energy, 4) transportation, 5) campus development & policies, and 6) curriculum & learning spaces. From these 9 categories, food & beverage has the highest ecological footprint due to the fact that the food system is one of the greatest contributors to GHG emissions (UBCFSP Scenario 1, 2009). Our group decided to focus on the food system management at the SUB because localized in the SUB are majority of the food outlets provided by both UBCFSP and AMSFBD, and as a result

produces a large amount of food waste on campus (MJ Waste Solutions, 2009). By focusing on reducing food waste produced at the SUB with strategies such as proper recycling and composting food waste can help reduce the amount of food wastes being transported to landfills and therefore can potentially reduce AMS's and UBC's ecological footprint significantly.

The Implications of the UBC SUB Waste Audit

Composting not only reduces GHG emissions (mainly carbon dioxide, methane and nitrous oxide), but also allows the food system to work more efficiently by regenerating healthy soil which is essential for the further production of crop (New Jersey department of environmental protection, 2007). Because this regenerated soil will be rich in nutrients, it has a lower demand for artificial fertilizers and pesticides. This reduction in demand is significant because artificial fertilizers and pesticides not only require energy to produce, but also because emission of GHG during their production is inevitable (New Jersey department of environmental protection, 2007).

Waste and waste transportation is greatly associated with GHG emissions. The UBC SUB waste audit revealed that 46% of post-consumer waste is compostable food waste (MJ Waste Solutions, 2009), which means that food waste that could have been composted was not. Almost half of the waste produced at the SUB can be potentially reduced if composting initiatives are maximized. Thus if this large proportion of waste is properly composted, the amount of waste transported to landfills can be significantly reduced.

Results of the SUB Student Composting Awareness Survey and Development of Composting Awareness Posters

While the Composting Awareness Surveys distributed showed us that although majority of students claimed to at least compost ‘sometimes,’ 10% of students who claimed to compost ‘often’ or ‘always’ did not seem to fully understand the idea of composting (i.e. when asked what items can be composted, some chose the option with tin cans and Ziploc® bags) or were not aware of the compost bins in the SUB. Some confounding factors may include discussion about survey questions among friends, a slight tendency to pick the “best” answer, as well as variability in the student’s own perception of ‘sometimes,’ ‘often,’ and ‘always’. In addition, we also realize that the ‘correct’ answer does not necessarily indicate that the individual understands the concept behind the question since they may have guessed the correct answer. There also seems to be a misconception about compost contamination since 26% of the students surveyed thought that waste management will sort out the compost eventually, indicating that they think that proper composting initially was not an important step. This is a significant point to address because if more students know that contaminated compost bins can no longer be used and are dumped into landfills, they may be more careful when they do sort out their waste for compost.

From the results of the survey performed, we feel that education about composting and its impacts should probably be addressed by developing an educational and awareness poster for students as recommended by MJ Waste Solutions that is aimed at reducing waste and increasing composting initiatives at the SUB. Majority of the students surveyed were familiar with the term ‘composting’ and had some awareness about what

composting entailed. However, due to the inconsistency seen with the results of the survey, we believe that simply raising awareness is not enough motivation for students to compost. To ultimately reduce GHG emissions, education about composting can play an important role in getting students to understand not only how to compost but also realize that there is a need to compost and how their actions can ultimately affect climate change and reduce GHG emissions.

Barriers

The problems faced by UBC exhibit traits on a smaller scale of those seen in cities around the world. The challenges regarding the implementation of waste reduction policies as well as education about composting are also seen on a global scale. To reach the long-term goals of moving UBC beyond climate neutral, it must first be recognized that currently there is a lack of municipal government policies and services for composting. A food system which involves multiple disciplines and collaborations between various fields and departments is needed for the implementation of new policies or changes. Reducing food GHG emissions means finding alternatives to air and truck transportations and finding the people who are willing to invest in these new researches, which can be very difficult and costly. This lack of resources and economic capabilities may have limited governments from exploring greater initiatives towards sustainability.

Along with the need for government initiatives, there must also be a personal concern about the environment and commitment to reducing GHG emissions. On a personal level, we as consumers must make decisions about our food choices after considering its ecological impact. To initiate this commitment, there is a need to create a

sense of urgency among the population about the reality of climate change. Once again, we feel a need for the government's involvement to initiate campaigns and educate about climate change to create this sense of urgency. This is not to say that slowing the progression of climate change is not attainable. It is important to recognize that global warming is a very real and needs immediate attention and action, but a realistic and yet feasible approach is required.

VII. RECOMMENDATIONS

After our group conducted and analyzed the results of the survey, we went on to set a series of recommendations we felt were crucial steps in moving UBC beyond carbon neutral. While our group recognizes that we have focused much of our research on the SUB in particular, we feel that with the high volume of students and staff from all faculties that the SUB provides services for, eliciting change starting from the SUB could possibly have a significant impact on the UBC campus and the results obtained might also possibly share a close resemblance to other faculty buildings.

1) Incentives for Composting

From our survey, 82% of the respondents were aware of compost bins present in the SUB; however, only 25% of these students composted often and a scarce 11% of students claim to always compost. This led our group to believe that awareness is not the main issue with composting; it is the lack of incentives to compost. After discussing some ideas, we recognize that there are many difficulties in imposing an incentive program for

composting since it would then require some form of regulation to make sure that a student had indeed composted in order to be rewarded.

- Stamp cards - After composting each time, students are rewarded stamp cards which are then redeemable for some sort of prize or discount at participating outlets.

2) Increasing Education

Out of the respondents from our survey, we noticed that some students, who despite claiming to compost 'often' or 'always,' failed to choose the correct answer for which type of wastes can be composted. This made us believe that some students could have confused composting with recycling (since some answered tin cans as compostable). Hence we identified that education on composting to distinguish it from recycling can be crucial in the future success of composting. Previous AGSC colleagues (group 21) have also identified this need.

- Imagine UBC day - A short 15 minute presentation/video during this day would be an ideal opportunity to increase awareness and knowledge on composting. Targeting first-year students of all faculties is particularly important since they can make the most impact if they start composting correctly during first year.
- Eco-friendly Day - Set up booths to answer some FAQ about composting and provide tips on how to compost correctly. Future AGSC 450 students can possibly set up a booth in the SUB to promote composting since there is high student traffic there.

- Compost workshops - Host workshops on how to build your own backyard compost. This website: <http://www.rrfb.com/pages/compost/Complan.html> contains some easy instructions on building your own compost.

3) Compost Labels

The waste audit revealed that the most common contaminants of compost bins were Styrofoam food containers and utensils. This problem can be targeted with more education about composting as mentioned above, but possibly also with the introduction of labels to mark food containers that are compostable. However, we are aware that introducing new labels require extra policies and regulations to be set and may not be an easy task to do.

- Compost labels - Having a label on containers either printed by an affiliated UBC branch or the producers of these compostable containers. These labels can have an eye-catching symbol and should be very noticeable (located at the centre of the containers) and easy recognized.

4) More Compost Bins

This recommendation should speak for itself. Despite the size of the UBC campus, there are only currently 70 locations with compost bins for the UBC organics collection program. We feel that over the next 2 to 3 years, all buildings and all events should at least have a compost bin present. By allowing composting to become more convenient, it will help students and staffs make the choice to compost and perhaps make it into a habit.

- Build only compost stations - Nancy Toogood identified cost as a barrier for increasing compost bins, stating that each of the ‘Sorting Stations’ (waste (landfill), recycling, and composting) cost up to \$1,000 to build. However, our group concluded that all buildings already have containers for plastic and garbage, so it is possible to reduce cost by only constructing the compost station alone.
- Compost bins at any events with food - We encourage a new policy declaring compost bins to be mandatory at any special events with food present.

5) Further Research:

UBC

- Compost audit - From the waste audit, it is already evident that composting can play a major role in the reduction of GHG emissions. We recommend a future audit focusing on composting specifically.
- Lobby for composting service from the municipal government - If the compost audit further reveals the benefits of composting on the environment, we feel that in order to maximize the efficiency of composting at UBC, it is crucial to gain the government’s support and involvement in providing a composting service much like the garbage collection.

Future AGSC 450 Colleagues

- Economical compost bins – Further research should be done to determine a more economical method for producing and implementing composting since cost is a major barrier.

VIII. CONCLUSION

With the recent climate changes, it is becoming more evident that the pressing issue of GHG emissions and its impact on global warming cannot be ignored. Action needs to be taken and UBC should be in the forefront as a leader guiding this change. The results of our research have shown that while UBC is starting to progress beyond carbon neutrality, it still has many opportunities for improvement. This includes increasing awareness and incentives for composting which could possibly help increase composting initiatives among students and the community, which will then reduce GHG emissions significantly. With the recommendations presented in this paper, we hope that UBC will become one step closer to moving beyond climate neutral.

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X. APPENDICES

Appendix 1

<<Compost and Climate Change Survey>>

- 1) Are you aware that there are compost bins in the SUB?
Yes No
- 2) How often do you compost?
Never Sometimes OftenAlways
- 3) Do you know what composting is?
(A) Food material sorted according to the color coding of the composting bin in the SUB
(B) Any product that can be recycled and produce carbon dioxide, water and biomass
(C) Composting decomposes and transforms organic material into a soil-like product called humus.
- 4) ____% of waste is actually organic matter that can be composted
(A) 10%
(B) 20%
(C) 50%
(D) 70%
- 5) ____% of the waste produced at Food Services outlets is made up of disposable containers, such as coffee cups and paper plates
(A) 10%
(B) 30%
(C) 40%
(D) 50%
- 6) What items can be composted?
(A) Fruits and vegetables, Plastic wrap, Aluminum foil
(B) Apple cores, Paper towels, Coffee ground, Ziploc bags
(C) Tin cans, Paper, Plastic utensils, Milk cartons
(D) Tea bags, Biodegradable utensils, All organic food wastes
- 7) What happens if compost is contaminated?
(A) It doesn't matter; compost can still be used as it is
(B) It doesn't matter; waste management sorts it out anyway
(C) Compost cannot be used, and instead will be dumped in the landfills

Facts about COMPOSTING

DO COMPOST 😊

- ❖ Food Scraps
- ❖ Fruit and Veggie Grinds / Peels
- ❖ Tea Bags / Coffee Ground
- ❖ Paper Towels
- ❖ Egg Shells
- ❖ Biodegradable Cutlery / Utensils

DO NOT COMPOST ☹️

- ❖ Styrofoam
- ❖ Plastic Cutlery / Utensils
- ❖ Metal Items
- ❖ Waxed Paper
- ❖ Plastic Containers
- ❖ Wooden chopsticks

DID YOU KNOW...

- ❖ UBC generates over 12 tonnes of garbage a day enough to fill 55 Volkswagen Beetles full of trash!!!
- ❖ 40% of waste produced at UBC Food Services outlet made up of disposable containers.
- ❖ You will RECEIVE A 15 CENT DISCOUNT by bringing your own mugs to some food outlets.

COMPOSTING HELPS PREVENT CLIMATE CHANGE... WHY?



- ❖ Climate change results from greenhouse gas emission including carbon dioxide, methane and nitrous acid. Greenhouse gases traps the sun's heat in our atmosphere causing warming in some areas or cooling in some area. For example, snow in March!!!
- ❖ Adding compost to the soil returns carbon from the food scraps to the soil, which helps provide the necessary nutrients for plant growth. The new plants can absorb the CO₂ from the atmosphere and produce O₂ for us

Climate Action Partnership Contribution of Food GHG Emissions Reductions: Moving UBC Beyond Climate Neutral

A Look at the Impact of Composting at the Student
Union Building

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I. ABSTRACT

In recognition of the contribution of food greenhouse gas (GHG) emissions to global warming, UBC has taken initiatives to reduce GHG emissions with the goal of moving beyond climate neutral. As a group, we have examined this problem in the context of our global food system and looked at UBC's role as one of the leading institutions in sustainability initiatives in North America. Our methodology included examining past scenario papers, literature review, looking at the UBC Climate Action Partnership paper, the SUB waste audit, an interview with Nancy Toogood, AMS Food and Beverage Manager, and performing a SUB Student Composting Awareness Survey. From our findings, we concluded that educating students about composting and the impact of composting in the context of climate change are critical steps towards increasing composting initiatives and reducing GHG emissions. As such, we then developed a set of four Composting Awareness Posters to be placed in the SUB for awareness and educational purposes. This paper will provide details about our research and recommendations for future AGSC 450 students to further this project in the years to come and help move UBC beyond climate neutral.

II. INTRODUCTION

A poll conducted by the University of British Columbia (UBC) revealed that four out of five Canadians feel that reducing GHG emissions and the effects of global warming should be a top environmental priority for the government (UBC poll shows Canadians feel greenhouse gas, global warming top environmental concerns, 2002).

Climate change is an issue that has been gaining much publicity and is a great concern to many. Some of the more obvious signs of climate change are retreating glaciers, melting ice caps, increasing incidences of natural disasters, and reduced air quality. One of the main factors contributing to this change in climate and global warming is the build up of GHG in the atmosphere, in which increasing levels of carbon dioxide (CO₂) have been a primary contributing factor (Halweil, 2003). The food system is a major source of GHG emissions due to transportation and processing (Halweil, 2003). On average, food travels approximately 2,500 to 4,000 km, with the two main means of transport as airplanes and trucks, which also happen to be the two with the highest CO₂ emissions (Halweil, 2003 and IPCC, 2007). Furthermore, food waste is a major component of waste material at landfills (MJ Waste Solutions, 2009). Every tonne of this waste material at landfills generates about 3 tonnes of CO₂ emissions (MJ Waste Solutions, 2009), which then makes a huge impact on the total amount of CO₂ gas produced globally.

UBC emits roughly 145,000 tonnes of CO₂ annually through operations and transit of staff and students to and from UBC (UBCFSP Scenario 1, 2009). To investigate this problem, the UBC Food System Project (UBCFSP), a community-based action research project, was initiated in 2002 by the Faculty of Land and Food Systems in collaboration with many key branches of UBC, including UBC Food Services (UBCFSS), AMS Food and Beverage Department (AMSFBD), UBC Waste Management (UBCWMM), Centre for Sustainable Food Systems at UBC Farm, UBC Campus and Community Planning, Sauder School of Business, UBC Sage Bistro, UBC Sustainability Office (SO), and UBCSO's Social, Ecological, Economic, Development Studies (SEEDS) program.

As part of the UBCFSP, we will investigate areas contributing to UBC's current GHG emissions and subsequently how to reduce emissions and its impact on the environment. In response to the recommendations made by last year's colleagues involved in the UBCFSP, we decided to focus our research on addressing the linkages between composting and the reducing GHG emissions. In particular, we hope to examine the issue of student initiatives of composting at the Student Union Building (SUB) and their impact on the reduction of GHG emissions and moving UBC beyond climate neutral. By doing so, we hope to fill in the information gap identified by previous groups involved in this project and help in the evolution of this ecology of knowledge.

In this paper, we will first define the problem in the context of our global food system, look at UBC's role as a leader in sustainability initiatives in North America, and reflect upon the vision statements provided by our AGSC 450 instructors. We will then proceed to talk about our research methodology and discuss our findings. We conclude with recommendations for future AGSC 450 students to carry on this project in the years to come.

III. PROBLEM DEFINITION

Climate change is a pressing global issue because it can have devastating effects on the ecosystem, global economy, and quality of life. As mentioned before, one of the main factors contributing to climate change is the emission of GHG from various sources, with the food system as one of the major sources (Halweil, 2003). The food system emits GHG through numerous channels including agriculture, food transportation, food processing, and waste production. Food transportation in particular makes up for majority

of the food GHG emissions because of its extensive reliance on the use of aircrafts and trucks, which are the two modes of transport with the highest GHG emissions (UBCFSP Scenario 1, 2009).

Slowing climate change is an international challenge. Despite this, various governments and institutions are making initiatives to overcome the barriers. For example, the Government of British Columbia has mandated a carbon neutral action plan: Bill 44: GHG Reduction Targets Act, in response to increasing GHG emissions. The purpose of this bill is to set a target for public sectors such as universities like UBC, to become carbon neutral by 2010 (Penner, 2007). In order to qualify as carbon neutral, the net emission of GHG must be zero (Allyn, Byland, Formigoni, Gosset, Holmes, Timoshouk, & Zach, 2008). In response to this policy, Simon Fraser University (SFU) has started the Local Food Project aimed at introducing more local foods to the SFU Burnaby campus (Sustainable SFU, 2008). Meanwhile, universities elsewhere such as the University of Santa Cruz and University of Manitoba have also taken their own steps towards sustainability by committing their food outlets to serve only food grown within 250 miles of their university (UC Santa Cruz, 2004) and researching a new method of agriculture requiring zero tillage which would reduce energy use as well as GHG emissions (University of Manitoba, 2005).

As a leading institution in sustainability in North America, UBC has also launched numerous projects to reduce carbon emissions. A prime example of this is the Ecotrek program, which faced major renovations of nearly 300 academic buildings and other infrastructures in order to reduce water and energy usage (UBC Ecotrek program, 2006). Through the Ecotrek program, UBC campus successfully saved core campus energy by

20% (UBCFSP Scenario 1, 2009). To further cement itself as a leader in sustainability, UBC created North America's first Sustainability Office which later launched the Climate Action Partnership (CAP) in 2007 (UBCFSP Scenario 1, 2009). The focus of the CAP was to take the goal set by the provincial government to the next step by moving UBC *beyond* carbon neutral (UBC Sustainability, 2009). This involves the collaboration of students, faculty and staff in creating solutions to reduce GHG emissions resulting from transportation and campus operations (UBC Sustainability, 2009).

In support of the CAP and as students, we feel that we have closer ties to UBC's food system as opposed to other administrative functions involving GHG production; for this reason we will specifically investigate the food system and its relations to climate change. Furthermore, due to time constraints of this project, and along with the fact that the food system's impact on GHG emissions is multi-factorial (including: food production, transportation, processing, waste, etc.), we decided to focus our UBCFSP specifically on waste reduction and composting initiatives at the Student Union Building in UBC. We feel that composting is significant because proper composting has shown to help reduce waste and lower CO₂ emissions, which in turn reduces GHG emissions (Michell, 2005). Through this project, we hope to find out more about composting initiatives at the SUB and their overall impacts on waste reduction and GHG emissions reduction at the UBC campus. We anticipate that this assessment will help us identify areas of improvement regarding composting initiatives and help carry out recommendations in hopes of moving UBC beyond climate neutral.

IV. VISION STATEMENT

Upon reflecting on the seven principles of the vision statement provided by our AGSC 450 instructors, our group came together to share our thoughts on the principles. While most of us agree that these principles are good objectives and targets from an ecological and industrial perspective, we find that to meet all the stated principles simultaneously may be challenging and unrealistic. Our group feels that some adjustments need to be made in order to make these goals more attainable and reach an ideal and sustainable UBC food system.

1. Food is locally grown, produced and processed (as much as possible)

This statement hinges on the definition of local: if local is as Andrew Parr described (as local as possible) then this vision would be very feasible. However, if local is to be defined to be grown on campus, our group has doubts about the practicality of this statement as UBC would most likely be compelled to resort to purchasing majority of food elsewhere.

2. Waste must be recycled or composted locally

We feel strongly that increasing awareness and providing education about the need to compost as well as the proper way to recycle and compost are important in achieving this goal. Since UBC has an in-vessel compost, this would help reduce the amount of carbon dioxide emissions from transportation, since the waste now does not need to be delivered to Cache Creek Landfill, which is 1200 km away.

3. Food is ethnically diverse, affordable, safe and nutritious

We feel that this vision contradicts with the first and last visions because at this time, it may not be viable to grow all ethnically diverse foods locally due to restrictions in climate. Also affordability of food varies by income and thus nutritious food may not be affordable for everyone in B.C. (MacDonald, personal communication, March 31, 2009).

4. Providers and educators promote awareness among consumers about cultivation, processing, ingredients and nutrition

Our group believes that the focus on promoting awareness should come before education, in order to create a sense of responsibility amongst students and the public about their food and health. For us as students, we can do our part by helping to increase awareness on the UBC campus.

5. Food brings people together and enhances community

Our group agrees that food is nourishing and enjoyable in a social setting. It is important to realize that food is more than something to eat; it also brings people and communities together, promotes social well-being and helps to define our culture.

6. Is produced by socially, ecologically conscious producers

There is a movement towards this principle but we feel that profit is still the main driving force behind production. There is a need to strive for a balance between being socially and ecologically responsible while being profitable at the same time because food services need to be profitable in order to be self-sustainable in the long run.

7. Providers and growers pay and receive fair prices

Our group had disagreements regarding this principle because as with fair trade coffee, even though there are people who are willing to pay more for it, there are also others who are not. But if vision 4 can be achieved, and the awareness on the connection between good health and nutritious food has been spread to the consumers, we believe more people will be willing to pay for better food.

V. METHODOLOGY

We started working on our UBCFSP by reviewing the scenario write-ups provided by our AGSC 450 project instructor and collaborators. Our initial focus was on last year's (2008) AGSC 450 Scenario 1 final reports and literature review to increase our understanding of carbon footprint, climate change, and GHG emissions. We divided up this initial literature research based on the questions provided at the end of our scenario, which included topics such as: the importance of climate change and GHG emissions, the link between climate change and our global food system, linkages between climate change and wider food systems at UBC, and a review of other (if any) campuses action on becoming climate neutral.

After our initial research, we reviewed "UBC Climate Action Partnership: The UBC Food System and Greenhouse Gas Emissions," which was a compilation of 2008's Scenario 1 papers. From the recommendations section of this paper, we decided to focus on the "Marketing and Awareness Campaigns," specifically on the topic of increasing awareness amongst students in the Student Union Building (SUB) about composting and how composting relates to climate change.

We then proceeded to review AMS's Lighter Footprint Strategy and interviewed Nancy Toogood, AMS Food and Beverage Manager, to first determine if there was a need for our marketing campaign. Through her, we managed to get in contact with Carolina Guimaraes, AMS Sustainability Strategy Coordinator, to obtain a waste audit of the SUB in order to find out more about the success of composting at the SUB. We then proceeded to consult Nancy about the possible methods of marketing, for example: whether to conduct surveys, what media of marketing is suitable for our audiences (i.e.: posters, emails, etc.), and if we were to make posters, where we should place the posters. She provided her ideas and suggestions but told us to think about what would appeal to us as students as a possible effective marketing strategy. After much discussion with Nancy and as a group on our own, we decided to develop a set of questionnaires to survey the students at the SUB about their knowledge of composting. As an incentive for completing the survey, we handed each student a candy and a small information sheet about composting and climate change (see Appendix 1 and 2). Our group dispersed in the SUB, including the main floor and basement area to perform random sampling to represent the population of students using the SUB facilities. Because both the survey and information sheet were short, we felt that students may be willing to take that extra few minutes to complete the survey and read the information sheet. In this way, we can get an idea of students' level of knowledge regarding composting, and inform them about composting and climate change at the same time.

To further raise awareness about composting and climate change, we also decided to develop a set of four posters to be placed in bathroom stalls in the SUB. The poster will demonstrate the link between composting and climate change, increase awareness and

encourage students to compost. We feel that posters placed in bathroom stalls usually have a higher tendency to be noticed and read by students because of the ‘idle’ time in washrooms. Nancy mentioned that AMS has an agreement with Zoom Media, who is in charge of advertisements in bathroom stalls, to have a certain number of advertisements used by AMS. Hence, it is possible that our poster might be displayed in bathroom stalls in the SUB over the next year. We decided not to have our posters put up at the AMS food outlets at the SUB because Nancy mentioned that the number of posters present at the outlets was becoming an issue (in terms of sustainability) for customers.

VI. FINDINGS AND DISCUSSION

FINDINGS

The UBC Student Union Building Background, Key Stakeholders, and Carbon Footprint

The UBC Vancouver campus serves up to 44,982 students and 13,622 faculty and staff (UBC Public Affairs, 2008), with the SUB being one of the primary locations for students, faculty, and staff to congregate. The SUB is home to over 15 food outlets managed by the two food service providers on the UBC campus: the AMS Food and Beverage Department (AMSFBD) and UBC Food Services (UBCFS) (Toogood, personal communication, Mar 4, 2009). UBCFS has food service outlets located all over the UBC campus including the SUB, while AMSFBD outlets are located solely within the SUB (Allyn et al., 2008). The food outlets at the SUB, together with numerous students, faculty and staff, generate about 96 kilograms of disposed waste each day, with about 32 kilograms as pre-consumer waste and 64 kilograms as post-consumer waste (MJ Waste Solutions, 2009). With the great volume of students, faculty, staff, and food service

outlets, waste management at the SUB has a vital impact on UBC's plan in moving beyond climate neutral.

Andrew Parr, manager of UBCFS, indicated that UBCFS has moved sustainability issues and climate neutrality to their top priorities in recent years (Allyn et al., 2008). AMSFS has also adopted climate neutral practices and is committed to reducing their carbon footprint (Toogood, personal communication, Mar 4, 2009). Both food service providers have made changes to help reduce waste and GHG emissions as part of their plan in reducing UBC's carbon footprint. For example, the increase in recycling and composting bins at the SUB has been made possible by both UBCFS and AMSFBD (Toogood, personal communication, Mar 4, 2009). Even though UBCFS and AMSFBD own and manage their waste and compost bins separately, the solid waste is collected as a whole by MJ Waste Solutions (Toogood, personal communication, Mar 4, 2009).

Focusing on solid waste reduction from landfills is vital in moving UBC beyond carbon neutral because the diversion of solid waste from landfills helps reduce about 3 tonnes of CO₂ emissions for every tonne of material recycled (MJ Waste Solutions, 2009). On the other hand, every tonne of material in the landfill contributes about 3 tonnes of CO₂ emissions (MJ Waste Solutions, 2009). Through recycling and composting activities, MJ Waste Solutions estimated that AMS is presently creating a "net savings of 603 tonnes of CO₂ emissions" (MJ Waste Solutions, 2009).

AMS's Lighter Footprint Strategy in Relation to Reducing Carbon Emissions

The AMS is the student society of UBC, and the society's mission is to improve the quality of the educational, social, and personal lives of the students (AMS Lighter

Footprint Strategy, 2008). The AMS represents more than 44,000 UBC-Vancouver students and operates student services, student owned-businesses, resource groups and clubs around the campus.

In an effort to attain an ecological future, AMS passed an Environmental Sustainability Policy in January 2007. With goals to become an active leader in reducing the university's ecological footprint to more sustainable levels, UBC is promoting sustainability practices along with the university community and broader society (AMS Lighter Footprint Strategy, 2008).

According to the Global Footprint Network, humanity's Estimated Ecological Footprint (EF) is now over 23% higher than what is sustainable, and more than half of our EF is due to GHG emissions (Global Footprint Network, 2007). The Lighter Footprint Strategy created by AMS is derived from the concept of EF. Dr. William Rees and Mathis Wackernagel, from UBC, developed a technique called Ecological Footprint Analysis that measures how much fertile land a number of people require to produce the resources they consume and absorb the waste they produce (AMS Lighter Footprint Strategy, 2008). This technique allows AMS to use both qualitative and quantitative methods to measure the EF of the targets around the campus. The targets can be divided into 2 types: 1) internal target, and 2) interactive target. Internal targets are objectives that can be carried out by AMS without the help from other parties, whereas interactive targets are those requiring interactions with other cooperation such as UBC administration, TransLink, the City of Vancouver, or student organizations at other universities (AMS Lighter Footprint Strategy, 2008). The ecological impact of each target can then be categorized as low, moderate, high, or very high based on the principles of EF. This strategy has been one of

AMS’s most important environmental achievements in helping reduce emission by 16,000 tonnes per year around the UBC campus (AMS Lighter Footprint Strategy, 2008).

The UBC SUB Waste Audit

A study on waste was conducted on February 12, 2008 by MJ Waste Solutions in partnership with AMS Sustainability Strategy Coordinator, Carolina Guimaraes. Through this study, it was found that some of the primary components of the solid waste stream were: compostable food waste (39%), other plastics (13%), plastic film (13%), office paper (10%), compostable cutlery/dishes (10%), other paper (5%), beverage containers (3%), textiles (2%), fines (2%), coffee cups (2%) and chopsticks (2%) (See Figure 1) (MJ Waste Solutions, 2009). Compostable food waste, dishes and cutlery represented almost half (49%) of all waste disposed at the SUB.

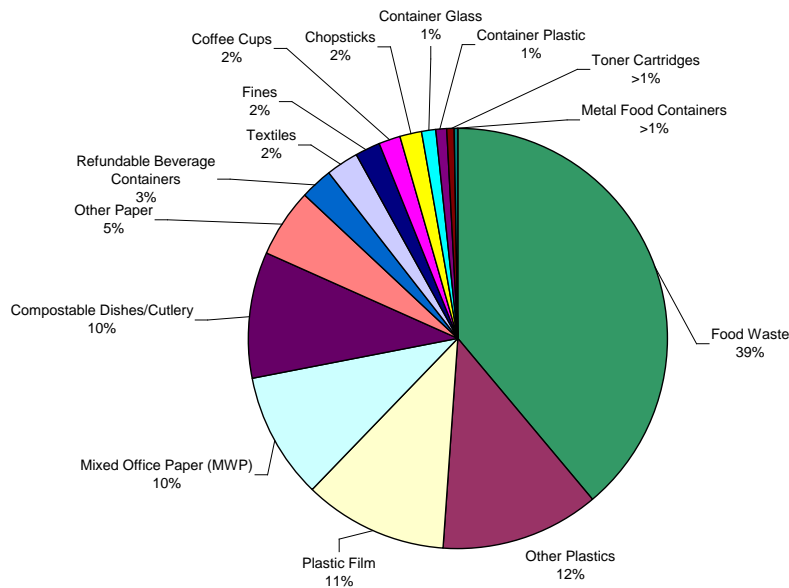


Figure 1: SUB Waste Composition—MJ Waste Solutions, Feb 2009

In particular, when looking at post-consumer waste, the primary components of solid stream waste were: compostable food waste (46%), other plastics (13%), and compostable cutlery/dishes (12%) (MJ Waste Solutions, 2009). Compostable items, including food wastes and compostable cutlery/dishes, make up the largest part of post-consumer solid waste stream, contributing to 58% of waste disposed (Figure 2) (MJ Waste Solutions, 2009).

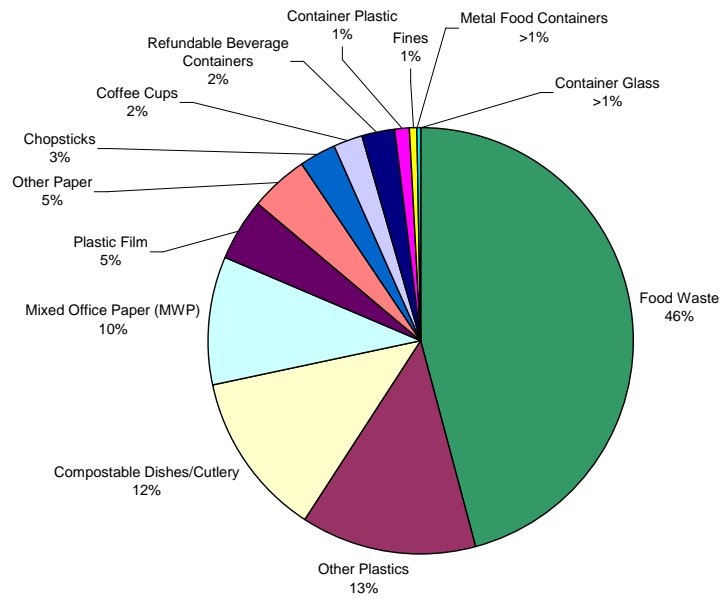


Figure 2: SUB Post-Consumer Waste Composition—MJ Waste Solutions, Feb 2009

To improve waste reduction at the SUB, MJ Waste Solutions proposed a few recommendations, one of which was to develop a communications program to the student body. In particular, they suggested updating signs at recycling stations, developing new handouts with pictograms about what can or cannot be recycled or composted, and developing and distributing informational posters (MJ Waste Solutions, 2009).

The SUB Student Composting Awareness Survey: Assessing Students' Level of Knowledge and Awareness about Composting

Since compostables represent such a huge component of solid waste stream at the SUB, especially in post-consumer solid waste, addressing this issue by targeting social marketing at the consumer level could potentially help reduce solid waste at the SUB and reduce GHG emissions. To address this issue, we conducted a student survey at the SUB to assess their level of awareness about composting in order to determine the appropriate approach (i.e.: to raise awareness about composting *or* to focus on educating about *why* and *how to* compost) to help increase composting at the SUB and reduce solid waste at the same time (see Appendix 2).

We approached a total of 80 students during lunchtime at the SUB hoping to obtain a diverse survey group. We found that out of these 80 students, 82% were aware of the presence of compost bins in the SUB (Figure 3).

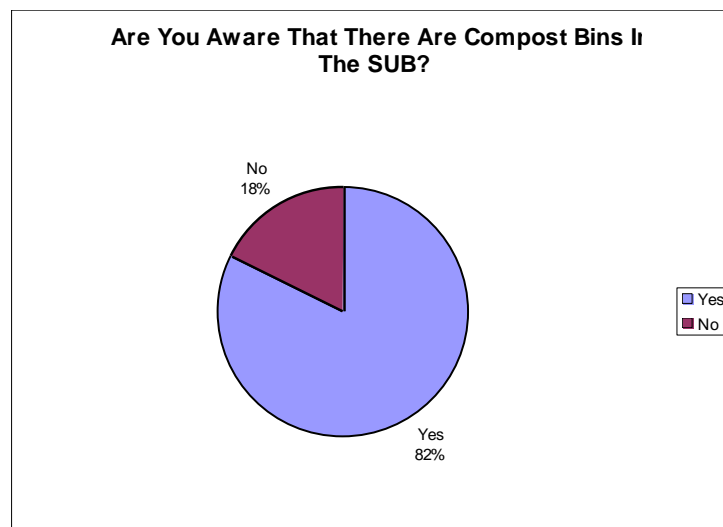


Figure 3: Students' Awareness of Compost Bins in the SUB

However, when asked how often they composted, 51% answered 'sometimes,' 11% answered 'always,' 25% answered 'often,' while 13% answered 'never' (Figure 4).

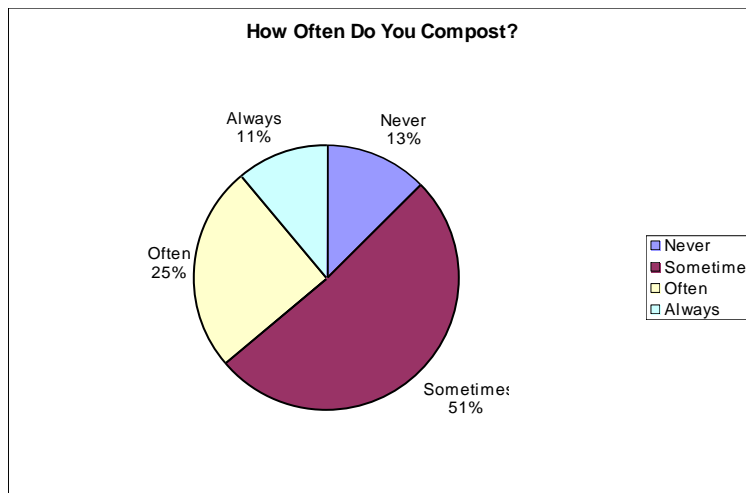


Figure 4: How Often Students Composted

In addition, the answers to the other survey questions are as follows:

- What composting is: 70% chose the right answer, 30% chose the wrong option.
- What percentage of waste is organic matter that can be composted: 40% chose the right answer, 60% chose the wrong option.
- What percentage of waste produced at food services outlets is made up of disposable containers: 29.49% out of those who answered chose the right answer (2 students did not answer this question).
- What items can be composted: 79.75% out of those who answered chose the right answer (1 student did not answer this question).
- What happens when compost is contaminated: 63% chose the right answer and 36.25% chose the wrong option.

DISCUSSION

Since the initiation of the UBCFSP in 2002, there have been significant changes made towards becoming a more sustainable community and reducing carbon emissions at UBC (Adams et al., 2008). Through our research we found that composting can potentially play a crucial role in helping UBC move beyond climate neutral by reducing the contribution of food GHG emissions. In our discussion we will focus mainly on AMS's Lighter Footprint Strategy in relation to reducing carbon emissions, the implications of the UBC SUB waste audit, the results of the Composting Awareness Survey, and the development of Composting Awareness Posters, in addition to some of the barriers we have identified through the course of our project.

AMS's Lighter Footprint Strategy in Relation to Reducing Carbon Emissions

The AMS created internal and interactive targets in order to determine which sectors around campus have the greatest ecological impact on the environment. Within these 2 types of targets, 9 different categories are sub-divided, with 3 of them belonging to 'internal' and the rest to 'interactive'. The 3 internal categories are: 1) food & beverage, 2) materials, and 3) communications, and the 6 interactive categories are 1) food & beverage, 2) building materials, 3) building energy, 4) transportation, 5) campus development & policies, and 6) curriculum & learning spaces. From these 9 categories, food & beverage has the highest ecological footprint due to the fact that the food system is one of the greatest contributors to GHG emissions (UBCFSP Scenario 1, 2009). Our group decided to focus on the food system management at the SUB because localized in the SUB are majority of the food outlets provided by both UBCFSP and AMSFBD, and as a result

produces a large amount of food waste on campus (MJ Waste Solutions, 2009). By focusing on reducing food waste produced at the SUB with strategies such as proper recycling and composting food waste can help reduce the amount of food wastes being transported to landfills and therefore can potentially reduce AMS's and UBC's ecological footprint significantly.

The Implications of the UBC SUB Waste Audit

Composting not only reduces GHG emissions (mainly carbon dioxide, methane and nitrous oxide), but also allows the food system to work more efficiently by regenerating healthy soil which is essential for the further production of crop (New Jersey department of environmental protection, 2007). Because this regenerated soil will be rich in nutrients, it has a lower demand for artificial fertilizers and pesticides. This reduction in demand is significant because artificial fertilizers and pesticides not only require energy to produce, but also because emission of GHG during their production is inevitable (New Jersey department of environmental protection, 2007).

Waste and waste transportation is greatly associated with GHG emissions. The UBC SUB waste audit revealed that 46% of post-consumer waste is compostable food waste (MJ Waste Solutions, 2009), which means that food waste that could have been composted was not. Almost half of the waste produced at the SUB can be potentially reduced if composting initiatives are maximized. Thus if this large proportion of waste is properly composted, the amount of waste transported to landfills can be significantly reduced.

Results of the SUB Student Composting Awareness Survey and Development of Composting Awareness Posters

While the Composting Awareness Surveys distributed showed us that although majority of students claimed to at least compost ‘sometimes,’ 10% of students who claimed to compost ‘often’ or ‘always’ did not seem to fully understand the idea of composting (i.e. when asked what items can be composted, some chose the option with tin cans and Ziploc® bags) or were not aware of the compost bins in the SUB. Some confounding factors may include discussion about survey questions among friends, a slight tendency to pick the “best” answer, as well as variability in the student’s own perception of ‘sometimes,’ ‘often,’ and ‘always’. In addition, we also realize that the ‘correct’ answer does not necessarily indicate that the individual understands the concept behind the question since they may have guessed the correct answer. There also seems to be a misconception about compost contamination since 26% of the students surveyed thought that waste management will sort out the compost eventually, indicating that they think that proper composting initially was not an important step. This is a significant point to address because if more students know that contaminated compost bins can no longer be used and are dumped into landfills, they may be more careful when they do sort out their waste for compost.

From the results of the survey performed, we feel that education about composting and its impacts should probably be addressed by developing an educational and awareness poster for students as recommended by MJ Waste Solutions that is aimed at reducing waste and increasing composting initiatives at the SUB. Majority of the students surveyed were familiar with the term ‘composting’ and had some awareness about what

composting entailed. However, due to the inconsistency seen with the results of the survey, we believe that simply raising awareness is not enough motivation for students to compost. To ultimately reduce GHG emissions, education about composting can play an important role in getting students to understand not only how to compost but also realize that there is a need to compost and how their actions can ultimately affect climate change and reduce GHG emissions.

Barriers

The problems faced by UBC exhibit traits on a smaller scale of those seen in cities around the world. The challenges regarding the implementation of waste reduction policies as well as education about composting are also seen on a global scale. To reach the long-term goals of moving UBC beyond climate neutral, it must first be recognized that currently there is a lack of municipal government policies and services for composting. A food system which involves multiple disciplines and collaborations between various fields and departments is needed for the implementation of new policies or changes. Reducing food GHG emissions means finding alternatives to air and truck transportations and finding the people who are willing to invest in these new researches, which can be very difficult and costly. This lack of resources and economic capabilities may have limited governments from exploring greater initiatives towards sustainability.

Along with the need for government initiatives, there must also be a personal concern about the environment and commitment to reducing GHG emissions. On a personal level, we as consumers must make decisions about our food choices after considering its ecological impact. To initiate this commitment, there is a need to create a

sense of urgency among the population about the reality of climate change. Once again, we feel a need for the government's involvement to initiate campaigns and educate about climate change to create this sense of urgency. This is not to say that slowing the progression of climate change is not attainable. It is important to recognize that global warming is a very real and needs immediate attention and action, but a realistic and yet feasible approach is required.

VII. RECOMMENDATIONS

After our group conducted and analyzed the results of the survey, we went on to set a series of recommendations we felt were crucial steps in moving UBC beyond carbon neutral. While our group recognizes that we have focused much of our research on the SUB in particular, we feel that with the high volume of students and staff from all faculties that the SUB provides services for, eliciting change starting from the SUB could possibly have a significant impact on the UBC campus and the results obtained might also possibly share a close resemblance to other faculty buildings.

1) Incentives for Composting

From our survey, 82% of the respondents were aware of compost bins present in the SUB; however, only 25% of these students composted often and a scarce 11% of students claim to always compost. This led our group to believe that awareness is not the main issue with composting; it is the lack of incentives to compost. After discussing some ideas, we recognize that there are many difficulties in imposing an incentive program for

composting since it would then require some form of regulation to make sure that a student had indeed composted in order to be rewarded.

- Stamp cards - After composting each time, students are rewarded stamp cards which are then redeemable for some sort of prize or discount at participating outlets.

2) Increasing Education

Out of the respondents from our survey, we noticed that some students, who despite claiming to compost 'often' or 'always,' failed to choose the correct answer for which type of wastes can be composted. This made us believe that some students could have confused composting with recycling (since some answered tin cans as compostable). Hence we identified that education on composting to distinguish it from recycling can be crucial in the future success of composting. Previous AGSC colleagues (group 21) have also identified this need.

- Imagine UBC day - A short 15 minute presentation/video during this day would be an ideal opportunity to increase awareness and knowledge on composting. Targeting first-year students of all faculties is particularly important since they can make the most impact if they start composting correctly during first year.
- Eco-friendly Day - Set up booths to answer some FAQ about composting and provide tips on how to compost correctly. Future AGSC 450 students can possibly set up a booth in the SUB to promote composting since there is high student traffic there.

- Compost workshops - Host workshops on how to build your own backyard compost. This website: <http://www.rrfb.com/pages/compost/Complan.html> contains some easy instructions on building your own compost.

3) Compost Labels

The waste audit revealed that the most common contaminants of compost bins were Styrofoam food containers and utensils. This problem can be targeted with more education about composting as mentioned above, but possibly also with the introduction of labels to mark food containers that are compostable. However, we are aware that introducing new labels require extra policies and regulations to be set and may not be an easy task to do.

- Compost labels - Having a label on containers either printed by an affiliated UBC branch or the producers of these compostable containers. These labels can have an eye-catching symbol and should be very noticeable (located at the centre of the containers) and easy recognized.

4) More Compost Bins

This recommendation should speak for itself. Despite the size of the UBC campus, there are only currently 70 locations with compost bins for the UBC organics collection program. We feel that over the next 2 to 3 years, all buildings and all events should at least have a compost bin present. By allowing composting to become more convenient, it will help students and staffs make the choice to compost and perhaps make it into a habit.

- Build only compost stations - Nancy Toogood identified cost as a barrier for increasing compost bins, stating that each of the 'Sorting Stations' (waste (landfill), recycling, and composting) cost up to \$1,000 to build. However, our group concluded that all buildings already have containers for plastic and garbage, so it is possible to reduce cost by only constructing the compost station alone.
- Compost bins at any events with food - We encourage a new policy declaring compost bins to be mandatory at any special events with food present.

5) Further Research:

UBC

- Compost audit - From the waste audit, it is already evident that composting can play a major role in the reduction of GHG emissions. We recommend a future audit focusing on composting specifically.
- Lobby for composting service from the municipal government - If the compost audit further reveals the benefits of composting on the environment, we feel that in order to maximize the efficiency of composting at UBC, it is crucial to gain the government's support and involvement in providing a composting service much like the garbage collection.

Future AGSC 450 Colleagues

- Economical compost bins – Further research should be done to determine a more economical method for producing and implementing composting since cost is a major barrier.

VIII. CONCLUSION

With the recent climate changes, it is becoming more evident that the pressing issue of GHG emissions and its impact on global warming cannot be ignored. Action needs to be taken and UBC should be in the forefront as a leader guiding this change. The results of our research have shown that while UBC is starting to progress beyond carbon neutrality, it still has many opportunities for improvement. This includes increasing awareness and incentives for composting which could possibly help increase composting initiatives among students and the community, which will then reduce GHG emissions significantly. With the recommendations presented in this paper, we hope that UBC will become one step closer to moving beyond climate neutral.

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X. APPENDICES

Appendix 1

<<Compost and Climate Change Survey>>

- 1) Are you aware that there are compost bins in the SUB?
Yes No
- 2) How often do you compost?
Never Sometimes OftenAlways
- 3) Do you know what composting is?
(A) Food material sorted according to the color coding of the composting bin in the SUB
(B) Any product that can be recycled and produce carbon dioxide, water and biomass
(C) Composting decomposes and transforms organic material into a soil-like product called humus.
- 4) ____% of waste is actually organic matter that can be composted
(A) 10%
(B) 20%
(C) 50%
(D) 70%
- 5) ____% of the waste produced at Food Services outlets is made up of disposable containers, such as coffee cups and paper plates
(A) 10%
(B) 30%
(C) 40%
(D) 50%
- 6) What items can be composted?
(A) Fruits and vegetables, Plastic wrap, Aluminum foil
(B) Apple cores, Paper towels, Coffee ground, Ziploc bags
(C) Tin cans, Paper, Plastic utensils, Milk cartons
(D) Tea bags, Biodegradable utensils, All organic food wastes
- 7) What happens if compost is contaminated?
(A) It doesn't matter; compost can still be used as it is
(B) It doesn't matter; waste management sorts it out anyway
(C) Compost cannot be used, and instead will be dumped in the landfills

Facts about COMPOSTING

DO COMPOST 😊

- ❖ Food Scraps
- ❖ Fruit and Veggie Grinds / Peels
- ❖ Tea Bags / Coffee Ground
- ❖ Paper Towels
- ❖ Egg Shells
- ❖ Biodegradable Cutlery / Utensils

DO NOT COMPOST ☹️

- ❖ Styrofoam
- ❖ Plastic Cutlery / Utensils
- ❖ Metal Items
- ❖ Waxed Paper
- ❖ Plastic Containers
- ❖ Wooden chopsticks

DID YOU KNOW...

- ❖ UBC generates over 12 tonnes of garbage a day enough to fill 55 Volkswagen Beetles full of trash!!!
- ❖ 40% of waste produced at UBC Food Services outlet made up of disposable containers.
- ❖ You will RECEIVE A 15 CENT DISCOUNT by bringing your own mugs to some food outlets.

COMPOSTING HELPS PREVENT CLIMATE CHANGE... WHY?



- ❖ Climate change results from greenhouse gas emission including carbon dioxide, methane and nitrous acid. Greenhouse gases traps the sun's heat in our atmosphere causing warming in some areas or cooling in some area. For example, snow in March!!!
- ❖ Adding compost to the soil returns carbon from the food scraps to the soil, which helps provide the necessary nutrients for plant growth. The new plants can absorb the CO₂ from the atmosphere and produce O₂ for us