UBC Social Ecological Economic Development Studies (SEEDS) Student Report

The UBC Food System:To Infinity and Beyond Climate Neutral

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The UBC Food System:
To Infinity and Beyond Climate Neutral

Scenario 1: Climate Action Partnership – Moving UBC Beyond Climate Neutral

Group 23

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Abstract

Food systems play a significant role in climate change. The UBC Climate Action Partnership (CAP) has proposed a goal to allow UBC to become “Beyond Climate Neutral”. There are many ways that the UBC food system can contribute to this goal. Different sectors of this food system (specifically in supply, consumption, and waste management and composting) all contribute to climate change in varying ways. Specific recommendations are made to allow the UBC food system to move beyond climate neutral.

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Introduction

The issue of climate change has become an increasingly important topic in today's society. There have been significant changes in our environment due to a dramatic rise in greenhouse gas (GHG) emissions largely over the past four decades. The Intergovernmental Panel on Climate Change (2007) estimates that between the years 1970 and 2004, there was a 70% increase in greenhouse gas emissions, 80% increase in CO_2 emissions, and a 120% increase in transport emissions. Without drastic changes in our living styles, the numbers will continue to increase at these large rates and will eventually lead to a global disaster (Intergovernmental Panel on Climate Change, 2007).

The Climate Action Partnership (CAP) was created with the goal to move UBC beyond climate neutral. The term "climate neutral" means that UBC's total damaging climate emissions are reduced wherever possible, and the remaining emissions are balanced by purchasing carbon offsets, resulting in a net climate change impact of zero (Ferris and Best, 2007). Beyond climate neutral will require UBC to not only achieve the above steps, but to engage in climate change research and provide solutions to this monumental issue.

Any food system plays a part in climate change and it is important to address this relationship. Specific components of the food system that contribute to climate change need to be considered. The food system contributes to greenhouse gases, CO_2 emissions, and transport emissions. Once these aspects are taken into consideration, measures can be taken to reduce UBC food system emissions. We

decided to focus on climate change factors in the food system because this has not been an area that has been previously researched at UBC.

Methodology

The paradigm that is used during the research and construction of this paper is one with weak anthropocentric values. We utilized many different sources to gather our data during our research. All of our group members have participated in the Roundtable on Food and Climates Changes event held in March 2008. We also had a meeting with Liz Ferris, the Climate Action Partnership (CAP) coordinator from the UBC Sustainability Office. Moreover, we obtained the Neptune Velocity report from Dorthy Yip (General Manager of UBC Food Services) electronically. The report is a detailed spreadsheet of foods that UBC Food Services bought from various vendors. We have also looked in past AGSC papers and other universities' climate change reports to gain a basic understanding of the current situation and also determine where they have left off. Lastly, we have reviewed UBC's ongoing climate neutral programs to continue research in areas that have not been previously explored.

It is first necessary to map out what the UBC food system actually includes. The UBC food system is defined in this paper to include the food purchased on land owned and operated by UBC as well as student residences. Private residences located on UBC and the endowment lands are not considered part of the UBC food system. One problem in defining the UBC food system is to account for food brought onto and taken away from campus. There are many staff, faculty, and students that choose to bring food from outside of campus or take food off campus. For simplicity,

we will assume that this factor produces a net change in the UBC food system that is negligible.

Emissions in the UBC food system will be observed by breaking the food system into three main components. The first component, supply, is defined by the aspects that are related to food production, distribution, preparation, and storage. Food produced on campus has a minimal contribution to emissions, while food produced off campus contributes to very high emission levels. The second component is consumption, which includes aspects of the food consumed on campus and the numbers of individuals that eat on campus daily. The third component is composting and waste management. Composting redirects food waste and other products from landfills to become beneficial products that can be resold as a resource (Common Energy, 2007). Once the UBC food system has been evaluated and the emissions from each system area are looked at in detail, recommendations will be made for the UBC campus food system. These specific recommendations will aid in the goal to reduce overall emissions and therefore will help to bring UBC beyond climate neutral.

Findings and Discussion

The international community, led by Intergovernmental Panel on Climate Change (IPCC, 2007), has agreed that climate change is caused by human and continues to affect our planet (Ferris and Best, 2007). For this reason, many universities have undertaken strategies to address sustainability and combat climate change. The College of Atlantic's Carbon Net-Zero Proclamation sets out targets for achieving 100% reliance on energy from renewable energy sources like wind and biodiesel by 2015 (Ferris and Best, 2007). In order to go beyond climate neutral, they

have integrated all the components of emission reduction strategies into their curriculum (Ferris and Best, 2007). Students have been assigned to quantify emission and write an emission reduction strategy, which in long term will cause a shift in the college's investment into renewable investment projects (Ferris and Best, 2007). The University of Florida is working on greenhouse gas inventory by quantifying the impact of commuter transportation and plane travel with the goal of reducing energy use from these sources by 40%. This will help improve the university's operational budget and achieve carbon neutrality by 2030 (Ferris and Best, 2007).

University of Victoria (UVIC) has responded to the issue of climate change by launching the Common Energy Network, a multi-stakeholder cooperative of students, staff, faculty, and regional partners working together to find solutions to climate change problems (Common Energy, 2007). The UVIC team has targeted their goal of going beyond climate neutral through a series of three working groups that support three campaigns: a climate trust fund, a university challenge, and a strategy document (Ferris and Best, 2007). A climate trust fund is a local carbon dioxide reduction project that has been reached and developed by working groups. The trust brings those who can invest and reduce emission with those who cannot invest and reduce emission (Common Energy, 2007). A strategy document is a goal moving climate neutral actions into curriculum in order to get students involved by using their solution for the problems (Common Energy, 2007). In order to move UBC beyond climate neutral, Agricultural Science 450 students in UBC are following with this model and working with the Common Energy Network to launch Common Energy UBC (Ferris and Best, 2007).

Going beyond climate-neutral is one of the strategic goals that Common Energy has set for universities and colleges (Beyond Climate-Neutral, 2008). UBC is among over a hundred leading educational institutions that have signed 1990's Talloires Declaration. Our university is committed to making sustainability the core foundation for campus operations, research, and teaching (Sustainability Office, 2008). To take sustainability into action, in 1997 UBC became one of Canada's first universities to adopt a sustainable development policy. In 1998, UBC opened a campus sustainability office. In the years between 2003-2006, UBC was Canada's first university to receive Green Campus Recognition from US based National Wildlife Federation (Sustainability Office, 2008). In early 2006 UBC published the first campus-wide sustainability strategies after consulting with 20 departments, all faculties, and major student organizations. In 2007, UBC added 21 targets to its 68 sustainability strategies (Sustainability Office, 2008). Along with its various projects UBC is also offering more than 300 sustainability related courses (Sustainability Office, 2008). Programs like Social, Ecological, Economic Development Studies (SEEDs), green building programs, student outreach activities, the EcoTrek energy, and water reduction programs are one of the campuses biggest initiatives (Sustainability Office, 2008).

Among the various projects that have been implemented by UBC and other universities to cut GHG emissions, the food system has been least incorporated into these targets. In order to reduce GHG emissions, components of our food system – including type of food, agricultural practices, transportation, and waste – have to be examined. Looking at these factors, the quantity of GHG emissions and our food system can be changed to reduce the negative impacts.

The types of food consumed or produced on campus contribute to GHG emissions depending on the respective energy intensity regarding the foods growth, processing, and transporting. Therefore, it is important to be aware of food producers and retailers on campus and how much of any particular food they produce or sell. Among the foods produced and sold on campus, meat and rice are the main contributors to GHG emission (Capyk, 2007).

Most of green house gas emissions are associated with agricultural practices. These emissions can be reduced through utilizing the best agro-ecological practices. It would not be the best option to stop all the food outlets on campus from selling the food that tend to emit more green house gas emission, but reducing those emission would be possible by directing the food outlets associated with UBC to buy from sources like UBC Farm that the use of best agricultural practices as part of their policy.

Agriculture is a major contributor of direct and indirect greenhouse gas emission. Industrial farming is particularly problematic because it is a key emitter of methane and nitrous oxide, which have, respectively, 23 and 296 times the global warming potential of carbon dioxide. The widespread use of nitrogen fertilizer, often wasted in leaching and runoff, contributes to approximately three quarters of the country's nitrous oxide emission. The livestock sector alone is responsible for nearly one–fifth of the world's total emission, which is more than the entire transportation sector. Globally, agriculture is responsible for nearly two-thirds of methane emission (Lappe, 2008).

The UBC Farm is a small-scale organic farm whose main income is generated from the sale of organic produce to West Point Grey residents, local areas around UBC, and restaurants (Izadpanah et al., 2007). UBC Farm produces food without the excessive use of pesticides and other hazardous chemical inputs. For example, it uses manure as fertilizer for their crops, conserve scarce water resources, and conserve soil resources through erosion-prevention methods (Izadpana et al., 2007). These methods include using cover crops, addition of organic matter to the soil, and using low-impact tillage techniques. A Saturday farmer's market supplies organic fruits, vegetables, eggs, and honey to local consumers (Izadpanah et al., 2007). UBC Farm also supplies its organic produce to several local restaurants such as Sage Bistro, Provence Mediterranean Grill, and The West Restaurant. Approximately 15% of UBC farm market harvest is consumed by these restaurant purchasers (Izadpanah et al., 2007). Sprouts, an organic food store located in the Student Union Building (SUB), receives 30 – 40% of its produce from the Farm, but represents less than 5% of total Farm produce production (Izadpanah et al., 2007). UBC Farm also hosts special events like Farmade every September and October to promote farm produce (Izadpanah et al., 2007).

Two major food providers on campus are UBC Food Services (UBCFS) and AMS Food and Beverage Department (AMSFBD). An ecological footprint (EF) of the AMSFBD is difficult since AMS runs several busy food outlets that provide food to thousands of students daily (Capyk, 2007). UBC Food Services (UBCFS) is a fully self-funded department composed of four major business segments: cash operations (cafeterias, snack bars, and franchise operation) comprise 36% of total operations; residence dining (Totem Park and Place Vanier Residence) comprise of 36%; UBC

catering (full service and casual catering throughout campus) occupies 17%; and finally University Centre (Sage Bistro and Sage Catering) which comprises of 7% (UBC Food Services, 2008). Among UBC's project to move UBC beyond climate neutral, UBC Food Services is committed to becoming part of the campaign (UBC Food Services, 2008).

For instance, Pie R Squared Pizzeria (run by the AMSFBD) alone uses about 10 tons of mozzarella cheese every year. Pendulum Restaurant's footprint was calculated and is equivalent to 340 hectares per year based on an average of 350 customers per day (Baynham and Dalton, 2005). In terms of production footprint, the restaurant uses only small amount of seafood and large amount of dairy (Baynham and Dalton, 2005). The large amount of dairy cheese is the biggest contributor to green house gas emission, since approximately ten litres of milk is required to make one litre of cheese (Baynham and Dalton, 2005). According to a study that was done on the restaurant, truck tend to contribute a footprint that is seven times higher than both train and ship transport (Baynham and Dalton, 2005). Thus, an item like tuna, which travels over 13000 km by ship from Thailand, would have a smaller footprint than food items of same weight (Baynham and Dalton, 2005). In terms of appliances, refrigerators run 24 hours a day and a grill is on for the entire time that Pendulum restaurant is open (Baynham and Dalton, 2005). Lights, heating, and cooling are shown to have a lower ecological impact.

In order to understand how food production and distribution use the best agricultural practices in relationship to GHG emissions, it is important to be aware of producers or wholesalers food outlets on campus and how much of particular food they produce. Types of food consume or produce in campus would contribute to

greenhouse gas emissions depending on how much they have been grown, processed, and transported (Capyk, 2007). Among the foods produced and sold on campus, meat and rice are the main contributors to GHG emission (Capyk, 2007).

One of the largest sources of greenhouse gas emissions is the transportation sector, mainly due to its dependence on fossil fuels such as gasoline, diesel, coal and oil. Burning these fuels produces carbon dioxide, the principal greenhouse gas, making the transportation sector the largest source of carbon dioxide emissions in Canada (Natural Source Canada, 2006). The average car produces about 2.4 kilograms of CO_2 for every litre of gasoline used. Emission from cars contributes to urban smog, acid rain, and other environmental problems (Natural Source Canada, 2006). Even though new technology has been developed to reduce this harmful emission, technology does not exist for “cleaning up” this major greenhouse gas (Natural Source Canada, 2006).

Increased food transportation makes up a significant proportion of total transport emissions. Some of the causes of the massive increases in food miles have been identified. First, food and feed are being imported and exported all over the world more than in the past. Airfreight is the fastest growing mode of food transport. It accounts for 11 percent of the food industry’s transport emissions despite only carrying one percent of the food. The average number of miles that our food travels has doubled in 30 years (Friends of the earth, 2007). Secondly, changes in retail are also responsible for increased food miles. The rise in the number of supermarkets means that more food has to go through regional distribution centres, mainly traveling by large trucks (Friends of the earth, 2007). Thirdly, the change in people’s shopping patterns contributes to the greenhouse gas emission. We have gone from making

frequent trips walking to local grocery stores to weekly car trips to out of town supermarkets (Friends of the earth, 2007). According to research, around one in ten car journeys are for food. The food miles wasted on unnecessary car journeys are thought to be the equivalent of over half a million transatlantic flights a year (Friends of the earth, 2007).

The UBC food system serves over 31,000 undergraduates, over 6,000 graduate students, approximately 1,800 full time academic staff, and 12,000 general staff (UBC Food Services Report, 2006). To satisfy diverse needs and provide good quality and reasonably prices food that is only purchasing local food is extremely chanllenging. However, to reduce the greenhouse gas emission, we should promote local foods consumption. We are pleased to see that many programs at UBC are leading to this direction. In summer of 2003, UBC food services purchased about $1,100 of products including herbs and salad greens from UBC farm (UBC Food Services, 2008). SEEDs, students, and sustainability office are developing initiatives to create an ongoing sustainable seafood program within UBC (UBC Food Services, 2008). UBC also has a house brand coffee that comes from supplier PuraVida. This coffee is 100% ethically operated and is available at all UBC Food Services outlet except the franchise outlets within UBC. UBC Catering and Sage Bistro have offered this product since the fall of 2006 (UBC Food Services, 2008).

Way-To-Go program is one of the programs at UBC Vancouver that encourages residents to use reusable containers, and reward those that support waste reduction (UBC Food Services, 2008). In order to encourage students to use alternatives to Styrofoam and plastic containers, UBCFS distributes a reusable container to each resident (UBC Food Services, 2008). Students are also welcome to

take advantage of a ten cent discount for using reusable containers, and avoid 25 cent charges for using disposable containers (UBC Food Services, 2008). Furthermore, UBC Food Services offers customers a 15 cent discount when they use their own mugs or food containers at any UBC outlet on campus (UBC Food Services, 2008). This initiative has reduced the use of paper cups by 10% (UBC Food Services, 2008). In order to reduce packaging and limit truck traffic by the number of deliveries per week and number of contracted vendors, UBC Food Services has its own purchasing staff that tender and award contracts and manage departmental procurement needs (UBC Food Services, 2008)**.**

Arguably, one of the most important factors that affect climate change and our state of carbon neutrality is our habit of food consumption. This can be traced back to the simple concept of supply and demand: industry increases supply as our demand increases. This relationship between food production and food consumption practices was realized in an epiphany during the UBC Climate Change Roundtable when Kevin, the head of UBC catering, stated that, “As much as I hate fried chicken nuggets, if consumers want it, we have to make it.” (Food and Climate Change Roundtable, March 2008). What we want and what we buy is probably the single determining factor of what type of food is being produced and supplied.

If our eating habits determine food production and supply, then does this not mean our food choices govern the large part of carbon emissions and therefore the changing of our climate? In Al Gore’s book, ‘An Inconvenient Truth’, he states that “Americans consume about one fourth of the world’s beef,” and that “much of the world’s deforestation is a result of clearing and burning to create grazing land for livestock.” (TVA, 2007). This pattern of meat consumption is largely due to population

growth, rising incomes, and urbanization, and is projected to increase from 218 million tonnes of meat produced a year in 1997- 1999 to 376 million tonnes a year in 2030 (FAO, 2002). The rise in demand will lead to further deforestation and land degradation to support the cattle industry. In contrast to producing and supplying food by crops, producing and transporting beef uses up much more fossil fuel and therefore releases a tremendous amount of carbon emissions (WRI, 2008). The deforestation to produce more of these grass-eating, carbon-producing beasts also increases the amount of carbon emissions in the atmosphere through the destruction of vast tracts of carbon sinks (TVA, 2007).

The disruption of the nitrogen cycle, which affects drinking water, ground-level ozone formation, crop damage, forest dieback, and coastal fisheries can also be related back to our food consumption demands, particularly in the wide use of nitrogen fertilizers to cater to them (WRI, 2008). Global cereal consumption has doubled in the last 30 years, while global meat consumption has tripled since 1961 and is increasing at a linear rate (WRI, 2008). This increase in consumption and demand has forced the industry to increase production of cereal and meat by the quickest and cheapest way possible: inorganic nitrogen fertilizers. If this trend of meat demand were to continue, global fertilizer usage would increase by about 55% by 2010, leading to a greater disruption of the nitrogen cycle and an increase in GHG emissions from producing said meat (WRI, 2008).Currently, UBC Food Services is the leading provider of all things food related to students, faculty, and anybody else on campus. It consists of franchise operations found throughout campus (such as A&W, Starbucks, etc.), cafeterias, residence dining, UBC catering (on campus), and Sage Bistro and Sage Catering. UBC Food Services sees an annual revenue of around $23 million, with cash operations (such as the franchise operations, cafeterias, and snack bars)

and residence dining being equally the two most important sectors with 36% of the total revenue each (UBC Food Services, 2006). With these figures, one can conclude that UBC students and faculty are the sole consumers that UBC Food Services is catering to. Knowing this, it is common sense that UBC Food Services would conform itself to our consumption habits because, surely, its students and faculty are what keeps it alive. Approximately 11,000 students and faculty live on the UBC Vancouver campus. With UBC Food Services annual revenue of $23 million, this averages to about $2100 a person spent yearly on food on campus. With this buying power, students and faculty may be a force that can change what is being produced on UBC. If students and faculty were to stop buying meat, for example, UBC Food Services would find no logical reason to continue to supply meat and would sever the carbon emissions that meat production and transportation brings. Currently, Neptune is UBC Food Service's primary food provider for meat, poultry, seafood, groceries, frozen foods, dairy, and beverages. According to the 2007 Neptune velocity reports, UBC Food Services purchased 3,493 kg of meat, 9,510 kg of poultry and 19,1203 L of milk (D. Yip, personal communication, April 4, 2008). Many of the meat vendors Neptune purchases from are not local, adding to the food miles for UBC. The vast amount of meat and meat products purchased by UBC Food Services accompanied by the food miles needed to transport them to UBC leads to large areas of improvement in order to reduce GHG emissions.

Landfill gas is generated as a by-product during the digestion of organic material by the organisms that thrive throughout anaerobic conditions (Smithline, 2007). Fifty percent of the landfill gas is composed of methane, which is harmful to our ozone layer in earth's atmosphere and contribute to global warming (IPCC, 2007). Currently, the United States recovers less than 40% of methane from its landfills;

something many developed countries can improve upon in order to capture the energy produced by the landfills and reduce the harmful effects to climate change (Carling, Jaramillo, & Luscher, 2008). Although post-consumption waste contributes to a small amount (5%) of global GHG emissions, methane, a by-product from landfills, is the major source of emissions within the scope of waste management. Waste services also contribute indirectly through fossil fuel use (IPCC, 2007). Over 350,000 tonnes of waste is generated just in Vancouver every year (IPCC, 2007), all of which must be transported to landfill sites outside of the city (Metro Vancouver, 2008). As a consequence, an incredible amount of fossil fuels are burned in the transport of waste alone, further exacerbating the waste sectors impact to climate change.

The National Composting Council estimates that the average American household produces 650 pounds of food waste per year (Carling, Jaramillo, & Luscher, 2008). Being the largest contributor to landfill mass, reducing or recycling food waste would drastically reduce landfill mass and thus methane and carbon dioxide emissions. Currently, however, only 2.6% of food is recycled or reused in the United States. Although composting also contributes to GHG emissions much like waste in landfills, it actually helps reduce the overall GHG emissions by substituting the use of inorganic fertilizers. Composting also helps the soil by making it resistant to wind and rain erosion since soil structure is improved and soil-moisture holding capacity is increased (Alberta, 2007).

Recycling non-food products is another major way to reduce the amount of solid waste sent to landfill and further GHG emission. In addition, it saves the energy demand for the operation of refining the virgin material (Smithline, 2007). Substitution

of recycled material for primary use, such as packaging, can greatly promote the efficiency of product production as well as to reduce the landfill mass.

UBC is fully aware of the waste management issue and its impact on climate change. The University has implemented a variety of programs and projects to reduce, if not compost the waste on campus as much as they can. A great amount of pre-consumer waste such as packaging and food waste during cooking has been captured. According to the UBC Catering Services, all disposable utensils on campus are biodegradable; furthermore, they exert pressure on their suppliers to eliminate as much unnecessary packaging as they can to reduce pre-consumer waste. (Roundtable on Food and Climate Change, 2008)

According to Waste Management Department at UBC, 12 tonnes of garbage are generated daily - 70% of which can be recycled while a total of 35% of the waste stream is made up of compostable material (2008). Forty percent of the waste generated at campus food outlets is disposable containers, such as coffee cups and paper plates. The most significant contribution in waste management at UBC is the in-vessel composting facility on campus which is used to compost organic food waste generated on campus – in particular the residences – and turn into rich soil and fertilizer to be used on campus.

Recommendations

In order to reach and surpass carbon neutrality at the UBC Vancouver campus, we offer this set of recommendations to be made regarding the food system. The recommendations are divided into five categories: food miles, food retail, waste, awareness campaign and addressing the Climate Action Plan (CAP) emissions

inventory. The five categories represent what we feel to be the entire range of the UBC food system, and adhering to them will ensure that UBC will decrease its carbon footprint and advance in the path to going beyond climate neutral.

Food miles – the mileage associated with the transport of food and food related products at the wholesale, retail and consumer level – currently represent a significant portion of greenhouse gas emissions worldwide. In the UK, food transport miles in 2005, including all air, rail, ship and road travel accounted for 19 million tons of CO_2 emissions, or 3.5% of total emissions in the country (DEFRA, 2005; IPCC, 2007). UBC's commitment to sustainability must include a reduction in food miles associated with the local food system. Progress has already been made to this goal by introducing certain food products from the UBC farm into on-campus retailers. These include the squash pizza at Pie R Squared, and herbs at Place Vanier food outlet.

UBC farm, in partnership with the CAP, must continue to market its products to UBC consumers. The two organizations should set up dedicated staff members to work directly with UBC food providers and promote the purchase of campus grown crops. By approaching individual providers, this staff person will increase the farm's exposure and create personal ties to facilitate a working relationship that meets the needs of the food outlet. As of this year, however, the UBC farm is already at, or nearing, growing capacity (Frye, 2008). Farm managers must decide whether to focus marketing on individual consumers via the weekly farmer's market, or wholesale customers, namely UBC food outlets. Targeting the wholesale market has the potential to work favourably in terms of the CAP strategy to reduce food miles, but abolishing the farmer's market may not be in the farms best interest, as the weekly market is a strong tool for advocacy and a necessary community-gathering place.

Crop diversification is a crucial step for the farm. The cafeteria's requirement for food goes beyond what the farm is able to grow and provide. As a partner in the CAP, the farm should take more direction from the food providers. This will allow food providers to purchase an increased amount of locally grown food without sacrificing their menus. In addition, the major food providers on campus - AMS Food and Beverage Services and UBC Food Services – need also to look into adjusting their menus to include an increasing number of campus grown products. However, because these are independent business operations, they will first and foremost answer to consumers. Nevertheless, social enterprise is an emerging business model that responds through the for-profit sector to important and relevant social issues. The large food providers at UBC should lead by example and adopt this method of business, which we feel will create change in supply patterns and increase the amount of locally purchased food.

Waste is another significant source of GHG emission on the UBC Vancouver campus. In order to go beyond carbon neutral, UBC has to reduce the amount of solid matter that enters waste streams and increase the amount of organic waste composted.

Generally UBC produces 12 tonnes of garbage a day of which 40% is disposable containers (Wastefree UBC, 2008). Although UBC currently has a successful composting program (Ferris, 2007), the program can be expanded by considering what other universities have done and implementing some of their successful techniques. In order to decrease the amount of waste on campus, UBC can provide recycling containers free of charge on each floor of different buildings just as the University of Leeds has done (University of Leeds, 2008). UBC can provide

separate containers for organic waste around campus kitchens and on residences (University of Leeds, 2008). It is recommended to increase the number of recycling depository bins in residences because a majority of food products purchased off campus by university residents use petroleum-based containers, such as plastic cups and Styrofoam containers, which are not degradable (UVIC Common Energy, 2008).

Another strategy to reduce the amount of waste on campus is the “green discount and happy hour” program (Wastefree UBC, 2008). Students receive a $0.15 discount at most campus food outlets except Pie R Squared and franchised food outlets when they bring their own reusable containers (Wastefree UBC, 2008). UBC food services can provide reusable containers and sandwich wraps for both Pie R squared and franchised food outlets to encourage participation in the Wastefree program at UBC. As at, Harvard University, UBC can provide canvas bags or reusable, biodegradable bags for shopping, and compostable kitchen ware for all food outlets and all consumers on campus (Harvard Green Campus Initiative, 2007). UBC food services also can build more dining areas for students to sit and enjoy their meals rather than taking out food in single-use containers. In order to raise sufficient money to provide free recycling bins, reusable containers, canvas bags, etc, UBC can increase student fees to go beyond carbon neutral. Many students may be opposed to this recommendation, but UBC can get students approvals through awareness campaigns. UBC food services should additionally encourage or even supply “green cleaning dishwashing liquid” and “green cleaning products” at low prices for all food outlets, restaurants and residences, similar to initiatives at Harvard University (Harvard Green Campus Initiative, 2007).

Yale University has implemented a creative and sustainable strategy to decrease the campus' waste. University operations convert recycled cooking oil into bio-diesel and use it in diesel-engine vehicles (Yale University office of public affairs, 2008). UBC can use the same method as the Yale University to collect used cooking oils from UBC food outlets and convert it to bio-diesel by applying a catalyst to remove the glycerine in the cooking oil (Yale University office of public affairs, 2008). In addition to reducing the amount of waste, burning bio-diesel emits less CO_2 than burning fossil fuel (Yale University office of public affairs, 2008).

Carbon emissions attributed to energy consumption in buildings represent over 20% of total emissions at UBC only accounting for scopes 1 and 2 of the CAP inventory (Ferris, 2007). Already, considerable suggestions and changes have been made through the UBC Sustainability Office to decrease greenhouse gas emissions related to energy use (Ferris, 2007). Nevertheless, all food outlets on campus must be forced to adhere to stringent standards of energy consumption regardless of the condition of the building they are located in, most likely the current standard at UBC of LEED (Leadership in Energy and Environmental Design) Silver Green Building Rating (UBC Technical Guidelines, 2000). For instance, individual outlets in older buildings such as the Student Union Building (SUB) should install energy efficient lighting and Energy Star appliances. Furthermore, BC Hydro (BC Hydro, 2004) suggests using tankless water heaters because they are more energy efficient than conventional tank water heaters.

To facilitate the retrofitting of individual food retail spaces, we recommend that CAP create a co-operative group to manage all the various food providers on campus. This group will coordinate specific projects and provide advice to the business.

Additionally, cost savings can be accrued if certain technologies are purchased in bulk by the CAP group. This group should include not only AMS and UBC Food services, but individual franchises located in the SUB and elsewhere on campus.

Engaging the students, staff, and faculty at UBC in the beyond climate neutral movement will be one of the most important steps to reaching the CAP targets. The Sustainability Office can increase awareness among university stakeholders by offering more courses in different faculties that emphasize sustainable practices, such as the Agricultural Sciences 450 class in the Faculty of Land and Food Systems. Two examples from Aquinas College show that this field of study is becoming increasingly noticeable and popular: "Design, construction and operation of sustainable buildings" in applied sciences and an undergraduate major in “sustainable business” which combines formal businesses training with ecological, social, and environmental sustainability (Aquinas College, 2008). UBC should look to this and other post-secondary institutions for program ideas.

Like the University of Victoria (UVIC), UBC can initiate campaigns to encourage local food purchasing among students and staff (Local food purchasing Project, 2008). In order to do so, UBC food services could collaborate with all AMS and UBC food outlets, UBC housing, and UBC purchasing and distributors to promote local food products. It can also “demonstrate demand for local food through education (workshops partnered with the Campus Community Garden, as well as community groups), surveys, local specials on menus, integration with Residence Life cooking classes, and special events” (UVIC Common Energy, 2008). This campaign is especially important to increase products purchased from the UBC farm. UVIC has also created and distributed posters regrading disposable containers to increase

public awarness (UVIC Common Energy, 2008); the same idea could be used by UBC. UBC can expand its "green" advertising for non-disposable containers at all AMS and UBC food outlets and continue providing incentives such as discounts for consumers who purchase reusable containers at more UBC and AMS food providers as well as franchise outlets.

The above recommendations will best be implemented by reorganizing the current CAP Emissions Inventory to define and include an additional element in scope three: food. “Food” here represents any GHG emissions that result in the growing, processing/manufacturing, transporting, storing, sale, consumption and disposal of any and all food products that is *not* accounted for by other elements of the inventory. For example, refrigeration of food on campus is already measured under scope two (electricity), as are certain stages of transportation of food within campus by UBC fleet. The inclusion of the food element in the inventory is meant to target the emissions associated with food miles. Members of the CAP will be required to measure these emissions in order to present them properly in the inventory. This task will be lengthy and pose certain problems - such as double counting and missing externalities - for the team responsible; however, reaching UBC's goal of going beyond climate neutral forces researchers to fully understand the effect of food on climate change.

We have chosen specifically not to propose quantitative recommendations in this paper. The incredible work already completed by the CAP presents the total sum of GHG emissions at the UBC Vancouver campus (Ferris, 2007). The goal of the office is to reduce total emissions to as near zero as possible by 2010 and offset any that remains. Any reduction in emissions beyond 2010 will only result in positive

economic effects for the University, as UBC will be required to pay for any emissions in addition to the offsetting costs (BC Climate Action Secretariat, 2008). Therefore, the ultimate goal for UBC, CAP, and any on campus food provider is a 100% reduction in GHG emissions. We are not prepared to offer a timeline for reductions in the food system as only additional work by accountants will determine when and what projects should be implemented. With our limited knowledge of the finances regarding the CAP and the beyond climate neutral campaign, we do not want to make assumptions with regards to costs that could negatively affect students.

Conclusion

Climate change is one of the major issues that humanity is facing today. It is extremely important that solutions to this large-scale problem be explored. If action is taken to combat and prevent this problem on a community level at UBC, it is hoped that this action will spread to other communities and eventually become commonplace for the entire world.

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