The Compost System at the University of British Columbia

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Introduction

The University of British Columbia has been composting on campus for several years now and this paper discusses a few key areas surrounding this system. Firstly, this assessment will look at the composting machine located on the South Campus of UBC. Next, the compost route will be analyzed in some detail and finally a life cycle analysis of the compost bins will be shown.

It was found that the Greater Vancouver Regional District as a whole throws out waste that is 45.37% organic or 226.32 kg/yr/person, and 16.2% of the total waste came from food wastes (Technology Resource Inc., 2005.). UBC Waste Management also found that 70% of all waste on campus can be composted and 35% of all waste on campus is food waste. The following table offers an estimation of how much organic material passes through UBC in a year:

Table 1: Yearly Tonnage of Compostable Material at the University of BC

Compostable Material	Tonneage (per yr.)
Food	740
Residual Paper	513
Animal Bedding	166
Animal Waste	60
Wood	30
Yard Waste	200
Sawdust	22
Ash	12
Tonneages To South Campus Windrow (animal, yard waste only)	
TOTAL	**1, 743**

Source: (Allan, 2001)

All of the material in Table 1 was recyclable, and if it were over one year the daily capacity would be 4.77 tonnes per day if all 365 days of the year were considered working composting days, and 6.86 tonnes per day if the current working days at the compost facility were considered to be 254 days per annum (15 weekdays off plus the weekends throughout the year). Since the compost machine can handle a maximum of 5 tonnes per week the UBC compost machine could not handle the total amount of compost according to table 1 if only work days are considered as compostable days.

The Composting machine and Surrounding Facility

The compost machine at UBC is a Wright Environmental model 5TPD and its total daily capacity is 5 tonnes per day. The unit requires about 200,000 kWh of power per year and consumes about 132.5 L a day or 33.7 m^3 per year (www.wrightenvironmental.com).

Figure 1: A photo of the Compost Machine at UBC South Campus

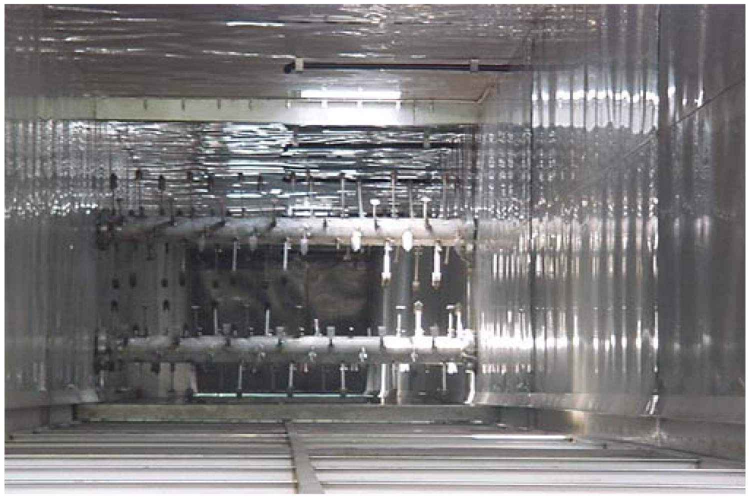

Figure 2: The inside of the empty compost machine

One of the labourers at the south campus facility told us that each weekday they mix 8 backhoe scoops of bark mulch with 16 compost bins two times a day into the compost machine. The backhoe barrel was estimated to be 0.3 cubic meters. The compost bins have a volume of 140 L or 0.140 cubic meters. The average bin that gets thrown in the compost machine is 75% to its capacity so the daily compost volume was estimated to be 3.36 cubic meters. In total, the volume of compost and bark mulch that enters the compost machine per day is 8.16 m^3. The compost from the bins in combination with the bark mulch was estimated to have a density of 250 kg/m^3, so the total daily mass input into the composter was estimated to be 840 kg/day or 213 tonnes per year of compost and 1200 kg/day and 305 tonnes per year of bark mulch for a total of 2.04 tonnes per day or 518 tonnes per year of compostable material. Since the maximum capacity is 5 tonnes per day, the compost machine is working at well under half of its maximum capacity and is able to handle 2.96 tonnes per day more organic matter. If the bark mulch to compost ratio is maintained at 1.42 m^3 bark mulch per 1 m^3 of compost and the density of the bark mulch and compost is assumed equal at 250 kg/m^3, then the compost machine could handle another 46 bins of compost accompanied with 23 scoops of bark mulch per work day.

A current Plant Op employee who works at the compost facility said she cleans out every bin that gets dumped and uses an estimated 3 L per bin or an average of 96 L per day and 24.4 m^3 per year. The total annual water consumption (Compost machine and bin washing) was estimated to be 58.0 m^3 per year. The following table summarizes the results surrounding the compost machine:

Table 2: Summary of Annual Consumption

Summary of Annual Consumption		
energy consumption	2.00E+05	kWh
water consumption	5.80E+01	m^3 per year
Compost from bins	2.13E+02	tonnes per year
bark mulch	3.05E+02	tonnes per year
compost produced	5.18E+02	tonnes per year

UBC Compost Pick-Up Route

The main objective of analyzing the UBC compost pick-up route was to account for and minimize indirect emissions associated with compost life cycle, such as emissions from the trucks used to collect the organic material from the bins. The analysis was based on the weekly 2006 data provided by the waste management facility in UBC. Currently, there are 138 bins, which have to be picked-up and emptied each week from 47 different locations on campus. The following chart gives a general idea of the bin distribution.

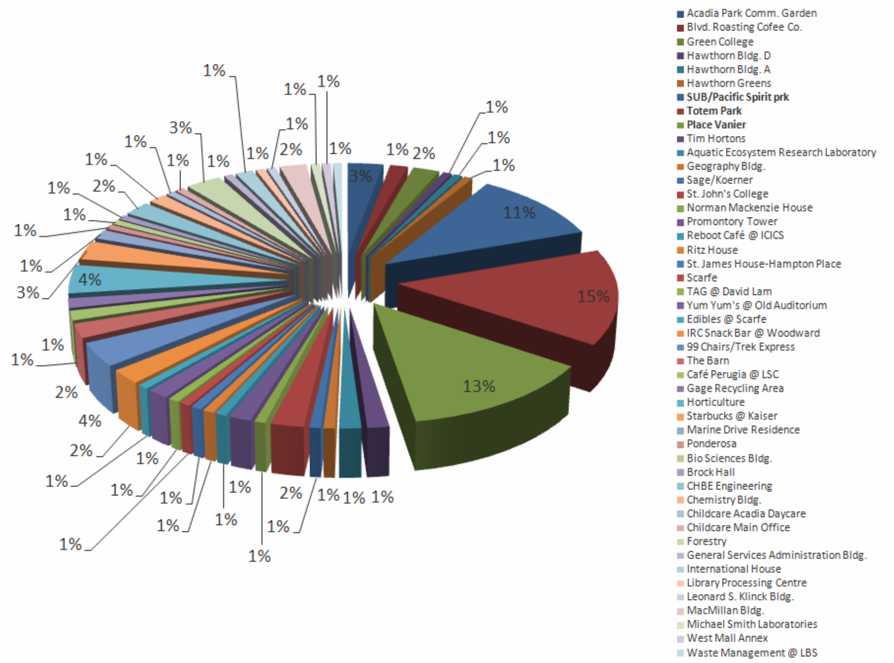

Figure 3 - Bin distribution between different locations in UBC

As it can be observed from the chart, the majority of bins (almost 40%) are located in Totem Park and Place Vanier residences and in the Student Union Building (SUB). This can be explained by a simple fact that these areas have high human traffic with approximately 2,500 people living and eating three times a day in the residences and a large portion of UBC population having meals in the SUB. Other locations have much smaller amount of bins (1-5), which are distributed over the entire campus area.

Figure 4 shows the total number of bins picked-up per month for the year 2006. As it can be observed, the total number of picked-up bins increased by the end of the year, which indicates the growing public awareness for composting. Also, there is a drop in the number of picked-up bins from May to August that can be explained by the fact that most of the students are away for summer holidays. The slight drop in the number of picked-up bins in February can be explained by the fact that it is a shorter month and that some students leave campus for the reading break. The drop in the number of picked-up bins in December is consistent with Christmas holidays.

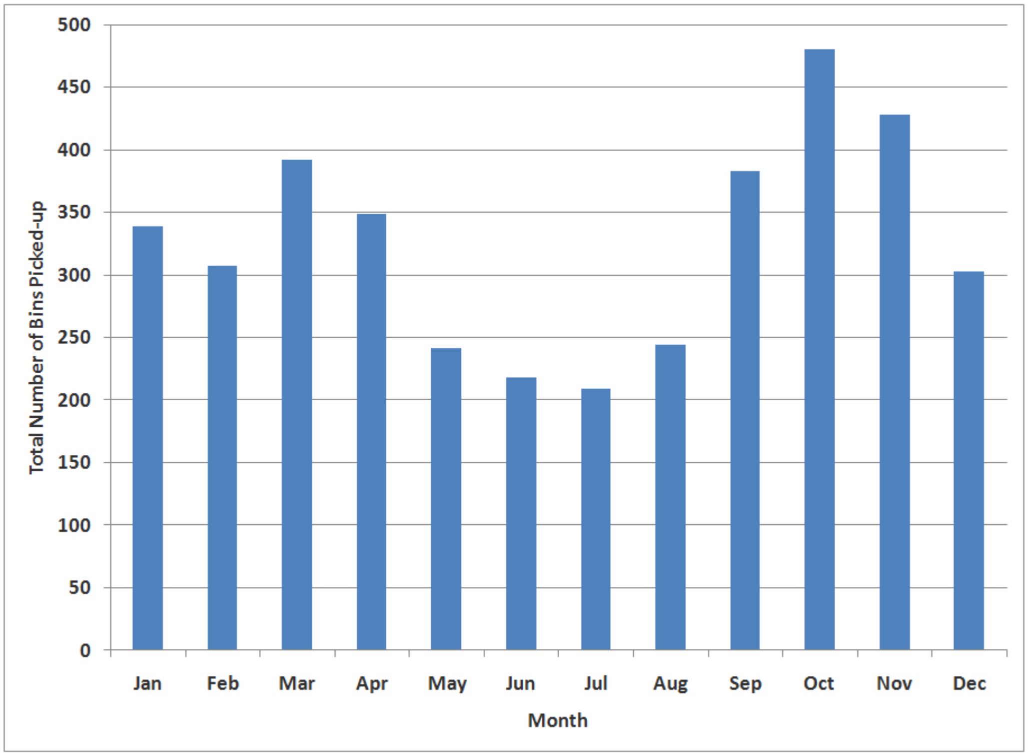

Figure 4 - Monthly amount of picked-up bins in 2006

Figure 5 shows the average number of bins picked-up per day for each month in 2006 and the total number of pick-up days per month (red line). It can be seen that the number of monthly pick-up days where the truck needed to empty and collect the organic material from the bins increased from 9 to 12 in 2006, which resulted in higher emission rates from the truck's internal combustion engine. 12 pick-up days per month is equivalent to 3 pick-up days per week.

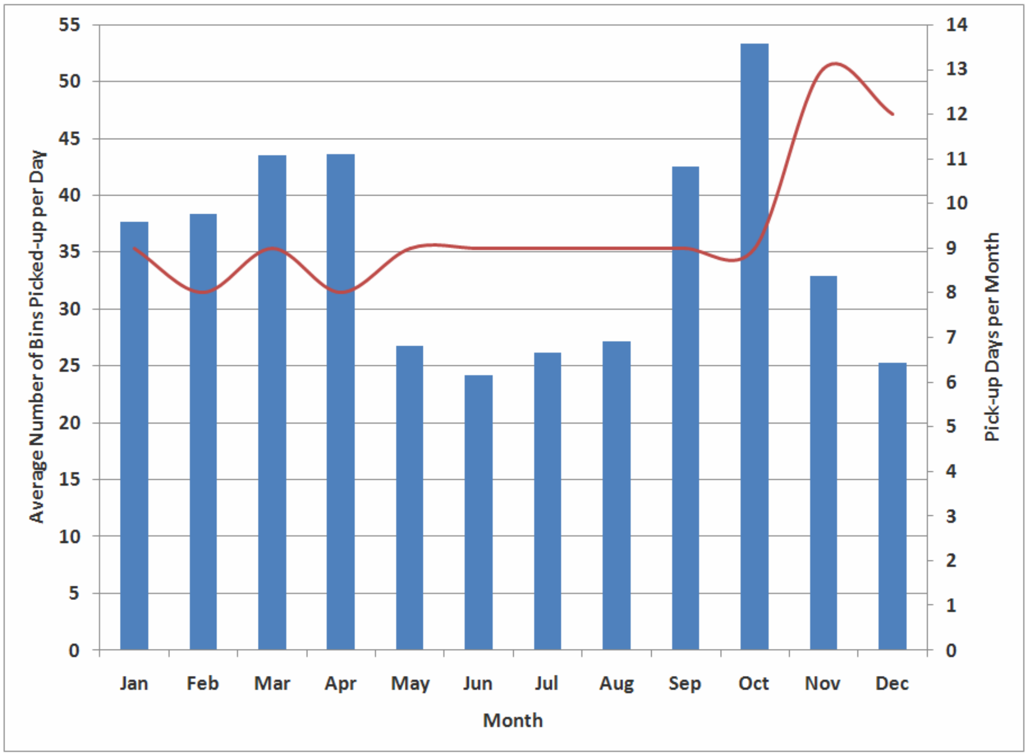

Figure 5 - Average daily amount of picked-up bins in 2006 by month

The truck used for the bin pick-up (shown in Figure 6 below) can hold approximately 32 bins, so based on the average number of bins picked-up per day (~50 during school months) two trips per pick-up day are necessary. Also, there are 56 bins per week, which are picked up from the off-campus location called Quest located on 1217 East Georgia Street. Two trips should be made to this location per week. The map on the next page shows the on-campus locations of the bins and the day of the week they are getting picked-up.

Figure 6 - Bin pick-up truck

Figure 7 - Mapped bin locations for each of the three pick-up days

Google Earth software was used to estimate the distance of the pick-up route for each pick-up day taking into the account that two trips per pick-up day should be made from the waste management facility and back. On average, the distance travelled per pick-up day is 40 km and the round trip to the off-site location is 33 km. The total distance travelled per month would be [(40*3) + (33*2)]*4 = 744 km. It was assumed that truck's idling time was 2 minutes per bin, which results in total idling time of 26 hours per month. Fuel consumption of the truck is approximately 0.2 L/km based on city driving and idling, bringing total consumption to 4 L/hr. This results in the total monthly fuel consumption of 250 L. Taking the gasoline price of 110 cents/L and multiplying it by 250 L/month yields $275/month.

Originally, the plan was to optimize the pick-up route to reduce the fuel consumption and, therefore, emissions. It was found out that the existing route is already efficient since all the bins are located in the close proximity to each other and to the main roads, which are West Mall, Main Mall and Westbrook Mall.

Compost Bin LCA

A life cycle analysis (LCA) takes into account the resource usage and environmental impact of consumer goods from the initial materials extraction all the way to usage and disposal. A full life analysis of materials, costs, and energy requirements would be too extensive. This exercise focused specifically on estimating the energy required to make a single compost bin.

The process was broken down into four steps: *ethylene production, polyethylene production, bin moulding,* and *bin recycling*. The container in question was SSI Schaefer's "Compostainer"; the dark green containers are used across UBC campus. The containers on campus are the 140 L variety though 120 L and 240 L versions exist.

Bin Moulding

The analysis began at the moulding phase where high density polyethylene (HDPE) is injection moulded into the compost bins. The step was the perfect starting point because the mass of HDPE and required energy are directly related to the weight of the finished container

To model the energy usage, the process was broken down to three steps: heating HDPE to its melting point, melting the HDPE, and heating the HDPE to the processing temperature. Heat capacity, temperature values, and heat of fusion were found through literature. Bin weight (27 lbs) was provided by the manufacturer, 3 lbs were subtracted in the following calculations to account for wheels and axles. Both parts were not included in this analysis. Pump loads for cooling water or air were assumed to be zero.

$Weight = W = 24 lbs = 10.87 kg$ (*SSI Schaefer Customer Support*)

$Cp = 2.2\, kJ/kgK$ (*www.matweb.com*)

$T_{ambient} = 25°C$

$T_{melt} = 125.4°C$ (*Guem et al*)

$\mathrm{H_f} = 165\, kJ/kg$ (*Guem et al*)

$\mathrm{T_{process}} = 210°C$ (*www.matweb.com*)

$$Energy = W\left[Cp\left(T_{melt} - T_{ambient}\right) + \mathrm{H_f} + Cp\left(\mathrm{T_{process}} - T_{melt}\right)\right]$$
$$= 6218\, kJ$$

Polyethylene Production

In this step the HDPE is made from ethylene gas. The polymerization reaction is highly exothermic, thus diluents are usually mixed with the ethylene beforehand. Ziegler-Natta catalysis is used in most processes to promote the crystalline structure that separates high density from low density polyethylene.

The key to modelling this step was the activation energy. It was assumed that the reaction proceeds spontaneously once the initial levels were met, and once again pump loads for cooling water are ignored.

$$W = 10.87 kg$$
$$Activation\,energy = AE = 37620\, {}^{kJ}\!/\!_{kmol} \qquad (Fernandes\, et\, al)$$
$$Molecular\,weight\,ethylene = Mwt = 28\, {}^{kg}\!/\!_{kmol}$$

$$Energy = \frac{W}{Mwt} \times AE = 14605\, kJ$$

Ethylene Production

The ethylene used in the HDPE is the result of ethane cracking where steam is added to an ethane stream then fed into a catalytic reactor. A side product from the reaction is solid carbon (coke) which is burned off to regenerate the catalyst and produces energy. Because of the complicated nature of this reaction, the process was instead modelled using the heats of formation and the process efficiency.

$$C_2H_6 \rightarrow C_2H_4 + H_2$$
$$C_2H_6 \rightarrow C_2 + 3H_2$$

$$W = 10.87\, kg$$
$$Mwt\,ethylene = 28\, {}^{kg}\!/\!_{kmol}$$
$$Mwt\,ethane = 30\, {}^{kg}\!/\!_{kmol} \qquad (http://energy.sdsu.edu)$$
$$H^{\circ}\,ethylene = 52280\, {}^{kJ}\!/\!_{kmol} \qquad (http://energy.sdsu.edu)$$
$$H^{\circ}ethane = -84680\, {}^{kJ}\!/\!_{kmol}$$
$$ethylene\,yield = \eta = 0.65 \qquad (www.qenos.com)$$

$$Energy\,(reaction1) = \frac{W}{Mwt\,ethylene}\left[H^\circ\,ethylene - H^\circ\,ethane\right] = 53170kJ$$

$$Energy\,(reaction2) = \frac{W}{Mwt\,ethylene}\left(\frac{1}{\eta} - 1\right)\left(-H^\circ\,ethane\right) = 17701kJ$$

$$Energy\,(total) = 70871\,kJ$$

Bin Recycling

HDPE products are a hundred percent recyclable and compost bins are no exception. Most recycled HDPE products are composed of old and new material, this is done to maintain certain percentages of crystalline structure so that material performance is not compromised.

In terms of energy requirements, using old material was similar to the *bin moulding* step since the HDPE is melted down and reformed. However, using new material would include all three of the previous steps: ethane is cracked to ethylene, the ethylene is polymerized, and then the HDPE is moulded to shape.

$$recycled\ material = R = 75\% \qquad (Cruz)$$

$$energy\,(old\ material) = R \times E_{bin} = 4664\,kJ$$

$$energy\,(new\,material) = (1 - R)\sum E_i = 22924\,kJ$$

$$energy\,(total) = 27588\,kJ$$

Remarks

The following table lists the results of the analysis.

Table 3 - Energy Distribution for a Single Bin

Step	Energy Required (kJ)	Distribution (%)
Bin moulding	6218	5.2
Polyethylene production	14605	12.3
Ethylene production	70871	59.4
Bin recycling	27588	23.1

The largest energy requirement was producing the ethylene though steam cracking, recycling also took a lot of energy simply because it uses a portion of virgin HDPE. Making the bin completely out of virgin HDPE would require 91694 kJ, considerably less than a recycled bin.

The flaws of the LCA were apparent; precise values could not be obtained and processes were heavily simplified. The system boundary did not extend all the way back to materials extraction either. One could make a claim against recycling given its sizable percentage which demonstrates how the interpretation of LCA results can lead to false conclusions.

The LCA is still a useful tool for comparing and quantifying resource requirements, but one must be aware of the assumptions and boundaries before arriving to a conclusion.

Recommendations

The recommendations surrounding the UBC compost system will be broken down into sub-headings with each recommendation roman numerically numbered.

i) Recording Equipment Use

There are a number of periphery units of operation that are necessary to allow for the UBC Composting system to work properly, and they should be accounted for to better integrate the entire system as efficiently as possible.
The bark mulch comes from organic material dispersed around campus. It consists of wood debris and leaf matter that is heavily collected during the fall and winter months. The machines and equipment used to collect this material consist of leaf blowers to gather the leaf matter, a backhoe to dump the piles into a container and a truck to deliver the bins of organic matter to South Campus where a wood chipper, tub-grinder and contaminant screener are used to further process the organic waste.

When interviewing Grazyna, one of the head gardeners at UBC, she was unable to provide us with any quantifiable information with regards to the amount of time and fuel consumed while using the above equipment.

Also, as described in the UBC compost route section, two trucks are currently being utilized to pick up the compost bins on campus. There has been no information recorded on a regular basis as to how much fuel is consumed by these vehicles.

It would be quite a simple additional requirement of the UBC Plant Operation Employees to record information in to a simple table with similar headings as the following:

Table 4: Equipment Recording Sample

Plant Op. Department	Final Purpose	equipment used	operating hours	type of fuel used	volume of fuel (L)	Date of Use

The above table could be more directly specified to each piece of equipment or vehicle used to simplify the number of options needed to be filled out. For instance, if a table is used for just the leaf blower, tests could be done to measure the average fuel consumption so all the operator needs to record is their department, final purpose, operating hours and date of use.

ii) Recording External Inputs other than Fuel and Water

The final use of the compost being produced is used to nourish the foliage around UBC campus; therefore, it should be imperative to analyze how effective the compost being produced is at maintaining UBC's greenery and what extra additives are needed to sustain such growth. For instance, how much petroleum based fertilizer and pesticides are used in the campus soil.

iii) Integrating water consumption at the UBC compost machine

It was suggested by Brenda Sawada that there may be a possibility of reusing the water used to rinse out the compost bins for the water needed in the compost machine. This is certainly an idea worth looking more closely at because, as shown in the compost machine section, around 34 m^3 of water per year is used by the compost machine and around 24 m^3 of water is used to rinse out the compost bins. If the water from cleaning the bins was collected into a reservoir the compost machine could quite easily be retrofitted to pump up water from that source rather than directly from the City of Vancouver water system.

iv) Suggestions for educating the Students and Public on Composting

Clearly the biggest obstacle found in better utilizing the compost system is the reluctance for the public to compost. Several recommendations are suggested to give students more motivation to compost.

v) Increase the number of compost tours

Tours of compost machine located at UBC south campus are currently being done but the number of tours could be increased to a much higher level. There could be a mandatory program created for those living in residences that include Totem, Vanier, Gage and Fairview to go on one of these tours at the beginning of the year. Of course this only covers a less than majority percentage of UBC students but it would greatly increase composting awareness across campus. Compost tours could also be offered as a field trip to courses which deal with topics similar to composting and waste.

vi) Volunteer/Student Involvement with the Plant Op. Facility

UBC Plant Operations could offer several volunteer programs where students could be trained to give tours or could work few hours a week promoting composting all across UBC. This recommendation is complementary to many of the other educational recommendations because it will take many volunteers to make the compost system at UBC a better success. Also more student volunteers in this sector at UBC will create a more open and creative dialogue with the full time workers in the various Plant Op. departments that are connected to the compost system.

vii) Composting poster in several languages

Vancouver is a very ethnically diverse city, especially at UBC, so it may be quite effective to promote composting using posters around campus that are dictated in several different languages. This recommendation could really catch the eyes of those who are most fluent in Mandarin, Japanese, Chinese, or Spanish.

viii) Write a list of what is compostable on the small compost bins available

A fellow student in CHBE 484 mentioned how it is not stated on the small compost bins what can and cannot be composted. She was unaware that paper towel is a compostable item that is suitable for such uses as general foliage compost around UBC campus. Since the small bins are potentially what most composters first throw their compost into, it is of key necessity to mention what is suitable to be thrown into them.

ix) Marking on garbage cans what should not be thrown into them

Coming from a different angle, the garbage cans around UBC could have labels put on them that say what should not be thrown into them; this list could consist of both recyclable and compostable items.

x) Put a small compost bin in every club room and staff room across campus

Most faculties and programs have a place where students and teachers can hang out to relax or eat lunch. It would be quite a simple task to put these compost bins into these places. Students and teachers from each program could volunteer to maintain the bins and throw the compost from the small bins into the bigger bins which would be located outside the building. If this system is found unworkable the janitorial service people could easily take on this role as well.

xi) Use a higher capacity truck to reduce trips.

With the growing number of bins on campus, increasing the capacity of the truck would be necessary to prevent multiple trips per day. Also, with a truck capacity of 50 bins only one trip to Quest would be needed each week.

xii) Increase the number of bins at high-waste locations.

Some locations produce a greater amount of organic waste than the bins can hold, so two trips per week are required for these locations. Increasing the number of bins would reduce the number of trips to one per week.

xiii) Switch to clean energy vehicles.

In the future, when the hydrogen fuel cell and electric battery vehicles become economically feasible, switching to those types of vehicles would reduce greenhouse gas emissions significantly.

Conclusion

The UBC campus has a robust composting campaign that has considerably reduced organic wastes and created added value through quality compost. This study found that while expansion is definitely possible, initiatives to reduce contamination was the greatest concern; several ideas were suggested such as increasing the number of compost tours. A route analysis found that the current bin placements are efficient and do not need changes. Life cycle analysis (LCA) on the composting bins shows that recycled plastic offers significant energy savings, though the study suffered from common difficulties and criticisms of LCA.

Appendix A: Calculations

Compost Bin Calculations

Backhoe bucket volume = 0.3 m^3

Compost bin volume = 0.140 m^3

Average bin capacity = 75%

Bark mulch and compost density = 250 kg/m^3

Compost loads per day = 2

Bins per load = 16

Bark Mulch scoops per load = 8

Number of bins 100% full of compost coming from Quest = 56 bins/week

Volume of compost per day = 16 bins/load*2 loads/day*0.140 m^3/bin*0.75 capacity

= 3.36 m^3 compost/day

= 3.36 m^3*250 kg/m^3 = 840 kg compost/day

Volume of bark mulch per day = 8 scoops/load*2 loads/day*0.3 m^3/scoop =

= 4.8 m^3 bark mulch/day

= 4.8 m^3/day*250 kg/m^3 = 1200 kg bark mulch/day

Workdays/year = 365 total days/year – 15work days for holiday/year –

12months/year*8weedenddays/month weekend days per year

= 254 workdays/year

Total mass of compost and bark mulch entering composter per day = 840 kg compost per day + 1200 kg bark mulch per day = 2040 kg/day = 2.04 tonnes/day

Ratio of bark much to compost = 4.8 m^3 bark mulch per day/3.36 m^3 compost per day

= 1.428

Mass of compost coming from Quest = 56 bins/week*250 kg/m^3 = 1960 kg/week

Mass of organic material that could be added = 5 – 2.04 = 2.96 tonnes/day

Number of bins that could be added per week day, x = 250 kg/m^3*.140 m^3/bin*
0.75 capacity*(x+1.428*x) = 2960 kg

Solving the above equation gives x = 46.4 bins/week day

Rounding down, the compost machine could handle 46 more bins per week day with 23 scoops of bark mulch accompanied with it.

Increased number of bins per 5 day week = 46 more bins/day*5 days/week
= 230 bins/5dayweek

Increased number of bins per 7 day week = 230 bins + 46 more bins/day*2 +
32 bins/day*2 = 386 bins/7dayweek

Water consumption from compost machine = 132.5 L/day*365 days/year*0.001 m^3/L
= 33.7 m^3/year

Water consumption from washing bins = 3 L/bin*32 bins/workdays*254 workdays*
0.001 m^3/day = 24.4 m^3/year

Total water consumption = 33.7 + 24.4 = 58 m^3/year

Appendix B: Further Statistics and Data

Table 5: Recorded bins picked up from December to January

Compost Bin Route

		12/12/2006	13/12/2006	15/12/2006	18/12/2006	19/12/2006	22/12/2006	02/01/2007	03/01/2007	05/01/2007	09/01/2007	10/01/2007	11/01/2007	15,18,19/01/07
Locations		(Tuesday)	Wednesday	Friday	Monday	Tuesday	Friday	Tuesday	Wednesday	Friday	Tuesday	Wednesday	Thursday	(M/Th/F--1wk)
	#of bins	collected	collected	collected	collected	collected	collected	collected	collected	collected	collected	collected	collected	common wk
Acadia Park Comm. Garden	4	3		4		1	4	3		4	4		4	2
Blvd Roasting Cofee Co.	2	1				3	2	2		1	2		2	2
Green College	3	1		3	2	1		3		3	2		3	3
Hawthorn Bldg D	1	1		1		1					1			1
Sage/Koerner	1										1			
St John's	3			3				3		4	2			4
SUB/Pacific Spirt prk	15	8		13	8			7		4	5		10	16
Totem	20	2		16	12		5	2			3		11	10
Vanier	18	3		18	10		10				6		10	20
Tim Hortons	2	1												2
AERL	2					1								1
Geography	1										1			
Hawthorn BLDG A	1	1									1			1
Hawthorne Greens	1	1									1			1
Norman Mackenzie Hosue	1	1									2			
Promontory	2					1					1			1
reboot @ ICICS	1	1									1			1
Ritz House	1	1									1			
St James House-Hampton Place	1										2			
Scarfe	1													1
TAG @ David Lam	1										1			2
Yum Yums @ Old Auditorium	2										1			
Edibles @ Scarfe	1										2			
IRC Snack Bar @ Woodward	3													1
Reboot Café @ ICICS	1													5
99 Chairs/Trek Express	5		4						1			4		
Barn	3	3	1						1			1		
Caffe Perugia-LSC	2		1						2					
Gage Recycling Area	2	2	2						1					6
Horticulture	6		6						2					
Kaiser/Starbucks	4				4				3					
Marine Drive Residence	2		2						1					
Ponderosa	1		2									2		
Bio Sciences (bi-monthly)	1													
Brock Hall	1						1			1				
Chem/Biol Engineering (bi-m)	3			1										1
Chemistry Building (monthly)	2													
Childcare Acadia Daycare (bi-m)	1			1			4			3			1	
Childcare Main Ofice (bi-monthly)	1						1			1			1	3
Forestry	4		2	4						4				
GSAB	1									1				
I-House	2										2			
LPC-library processing cnt (bi-m)	1			1						1				
L.S. Klink building (m)	1			1										
MacMillan	3													
Michael Smith Labs	1													
West Mall Annex (m)	1													
Waste Mgt Cllxn @ LBS	1								1					
	138	30	20	66	36	8	27	20	12	27	42	7	42	84

Table 6: Recorded bins picked up from January to February

Locations	22/01/2007	25/01/2007	26/01/2007	30/01/2007	02/02/2007	6,9/02/07	12/02/2007	13/02/2007	16/02/2007
Locations	Monday	Thursday	Friday	Tuesday	Friday	(Tues/Fr)	Monday	Tuesday	Friday
	collected	collected	collected	collected	collected	collected	collected	collected	collected
Acadia Park Comm. Garden	4			4	4	2		3	4
Blvd Roasting Cofee Co.	3		2		1	2		3	1
Green College	2			3	1	1	3		1
Hawthorn Bldg D	1				2	1	2		1
Sage/Koerner	1					1			
St John's	3		3		4	2	4		3
SUB/Pacific Spirt prk	6		15	7	10	8	17		1
Totem	9		14		4	15	4	9	8
Vanier	9		11	13	4	12		8	4
Tim Hortons		1							
AERL	1						2		
Geography	1						1		
Hawthorn BLDG A	1						1		
Hawthorne Greens	1						1		
Norman Mackenzie Hosue									
Promontory	1						1		
reboot@ICICS							1		
Ritz House	1						1		
St James House-Hampton Place	1								
Scarfe		2					1		
TAG @ David Lam	1								
Yum Yums @ Old Auditorium	1					2			
Edibles @ Scarfe							1		
IRC Snack Bar @ Woodward	4								
Reboot Café @ ICICS									
99 Chairs/Trek Express		5						8	
Barn		4							
Caffe Perugia-LSC		1							
Gage Recycling Area		2							
Horticulture		6							
Kaiser/Starbucks		6							
Marine Drive Residence		4				3			
Ponderosa		2				1			
Bio Sciences (bi-monthly)					1				
Brock Hall	1			1		1			
Chem/Biol Engineering (bi-m)						1			
Chemistry Building (monthly)									
Childcare Acadia Daycare (bi-m)					3	1			
Childcare Main Ofice (bi-monthly)					1				1
Forestry			5			1			
GSAB						1			1
I-House		1	1	1		1			
LPC-library processing cnt (bi-m)			1		1				1
L.S. Klink building (m)					1	2			
MacMillan				2		2			
Michael Smith Labs						1			
West Mall Annex (m)									
Waste Mgt Cllxn @ LBS		1							
	52	35	52	31	37	61	40	31	26

Table 7: Recorded bins picked up for 2006

	January	February	March	April	May	June	July	August	Septemb	October	November	December												December
Location	Total	Total	Total	Total	Total	Total	Total	Total	Total	Total	Total	1	5	6.7.	8	12	13	15	18 ?		19	20	22	Total
Acadia Comm Grdn						13	17	34	28	26	16			10		3		4		4	1		4	26
Blvd Roasting Coffee Co.						3	11	17	16	16	10		3			1				3	3		2	12
Green College	9	8	9	12	12	16	15	12	16	18	14				3	1		3	2	0	1			10
Hawthorn Bldg D (garage)					5	3	7	9	5	6	5					1		1		1	1			4
Sage/Koerner	8	7	9	8	9	9	8	9	8	8	6									1				1
St John's College	20	18	21	21	27	26	20	14	20	24	16							3		2				5
SUB/PSP	48	40	53	45	62	52	38	39	41	66	60	4				8		13	8	1				34
Totem	89	87	102	90	27	23	29	37	81	95	112	9		20		2		16	12	2			5	66
Vanier	97	84	113	93	16		0		89	106	83	5				3		18	10	3			10	49
AERL	15	4	4	4	6	4	4	4	2	4	1		2		1	1					1			5
Edibles @ Scarfe									0	2	1		0		0	0								0
Geography		3	4	4	2		1	1	4	4	1		1											1
Hawthorn Bldg A					5	2	4	5	4	4	1		1			1								2
Hawthorn Green	4	4	4	4	5	3	4	5	3	4	1		1			1								2
IRC snack bar @ Woodward									1	0	2		1		1									2
Norman Mackenzie House - President's Residence									0	0	3		2			1								3
Promontory	1	3	4	4	7	6	7	7	5	3	1		1								1			2
Reboot @ ICICS									0	2	1		1			1								2
Ritz House			3	4	3	4	3		2	3	1		1			1								2
Scarfe	5	4	3	3	4	4	3	4	3	3	1		0		0	0								0
St James House - Hampton Place									0	3	1		1		0									1
TAG @ David Lam	5	4	5	3	5	4	4	5	3	3	1		1											1
Yum Yum's - Old Aud									0	1	1		1		0	0					0			1
99 Chairs/Trek Express	0	0	0				0		6	10	13	3					4					3		10
Barn									1	6	5		4			3	1					1		9
Café Perugia - LSC	3	3	5	3	4	4	5	3	5	2	1	1		1			1							3
Tim Horton's at FSC (Tbird)														2		2	1							5
Gage Recycling Area	1	3	7	7			0		0	0	2						2							2
Horticulture									0	7	18			6			6					3		15
Kaiser/Starbucks	3	4	4	4	4	4	2	4	7	5	6								4					4
Marine Drive Residence									0	0	0						2							2
Ponderosa	1	3	5	4	3	5	3	2	3	4	3						2							2
Biol Sciences		0	1	3	2	1	2	2	2	1	2													0
Brock Hall	1	3	6	4	4	3	4	4	2	4	4							1					1	2
Chem/Biol Engineering		1	4	1	3	2	2	2	1	3	1													0
Chemistry Building- Skylight							1	1	1	3	2													0
Childcare Services - Acadia/Summer 73	2	2	3	3	2	3	2	2	3	3	3							1					4	5
Childcare Services - Chuva/Main Office	1	2	2	3	2	3	2		1	3	3												1	1
Forestry	12	7	7	6	4	9	1	4	5	9	6	2					2	4						8
GSAB				1	2	2	2	2	1	1	3	1												1
International House	5	4	3	4	4	3	2	4	4	3	2	1						1						2
LPC (library processing cnt)	3	2	2	3	2	3	2	2	3	2	3							1						1
LSK (Klink - monthly)							0	2	2	3	2													0
MacMillan	3	3	5	4	2	1	0		2	5	4													0
Michael Smith labs			1	3	2	1	2	1	2	3	4													0
West Mall Annex	1	2	2	1	2	1	1		1	1	0													0
Waste Mgt	2	1	1		1	1	1	1	0	1	2													0

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