

An Investigation into Organic Waste Management: Bin Liners
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APSC 262
April 10, 2014

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ABSTRACT

Organic waste management is an important aspect of promoting sustainability policies at the University of British Columbia (UBC). This report investigates options for keeping compost bins clean, and supports its findings by the Triple Bottom Line analysis. Products assessments, literature reviews, as well as primary data collection are conducted in order to assess economic, environmental, and social aspects of the problem. Given a broad range of bins currently in use indoors and outdoors on campus, the project scope focuses on small pails used in residences.

To determine UBC residents' opinions and habits, as well as to identify and evaluate solutions applicable to residences, a survey on residence composting has been prepared and distributed to current UBC residents. From the economic point of view, existing and proposed bin liner products have been assessed for economic feasibility. For the environmental aspect of the investigation, paper based bin liners as well as an option to wash the bins have been examined for materials compostability, safety, and resource consumption.

The survey has shown that the majority of residents are willing to compost, but would spend 10¢ or less per bin liner, whereas compostable paper bags cost two to four times more. Most survey respondents do not use any liners; others use plastic bags, which are formally not accepted by the UBC composting facility. This investigation has also found that the current composting system is less convenient than disposing garbage. This issue should be addressed with a set of comprehensive measures to make composting more convenient than throwing things away. For Walter Gage residences, a recommendation is to launch a pilot project to transform garbage chutes into compost only chutes. To address an issue of odours and flies, it is important to encourage frequent emptying of compost bins, which would also aid with keeping the bins cleaner. Due to the fact that no kind of plastic bags is accepted by the composting facility, it is recommended that either no bin liners are used, or UBC Housing supplies bin liners, since residents are unlikely to purchase compostable bags. To ensure that students do not dispose unacceptable plastic bags in their compost, it is necessary to educate residents on compost friendly items, as well as raise overall awareness of composting as means to reduce campus ecological footprint by each and every resident.

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GLOSSARY

Compost - Organic waste that can be used to improve soil structure and provide nutrients for the soil

Economic Feasibility - Comparison of the economic benefits and costs

Triple Bottom Line - A framework for measuring sustainability by looking at the social, economic, and environmental aspects

In-Vessel Composting - A closed loop composting method in an enclosed vessel

Biodegradable - A property of a material that can be decomposed by living organisms like bacteria

Cellulose - An organic compound that constitutes plant cell walls. Cellulose is used for paper and paperboard production.

Polylactic Acid (PLA) - A plant based degradable plastic made of plant starch, which is typically obtained from corn, sugarcane, and tapioca.

Kraft paper - A wrapping paper produced from chemically treated wood pulp. Kraft paper is typically used for packaging for its strength and durability.

Section 1.0 Introduction

This report is on an investigation into bin liners for the University of British Columbia (UBC) waste management system. The goal of this investigation is to recommend optimal solutions for keeping composting bins clean in a way that is both convenient and economically feasible.

Currently, there are three primary bins used for composting (Winkelman, 2014). The “Sure-Close” small pail is the most abundant, used in most student residences units, and in voluntary food scrap programs for office. It has an approximate volume of 7 litres (L). The Busch KC2000 with a volume of 9 L is used in a small number of residence units and office. Finally, the Schaefer Universal System Design (USD) 35 green cart is used to collect compost from the smaller pails and is placed in areas where large volumes of compost are generated. The compost from this bin is picked up by the UBC Municipal Operations and is taken to UBC’s In-Vessel composting system. The volume of the Schaefer USD 35 green cart is 140 L. A proposed future bin is the Rubbermaid 2957 Wastebasket, with a volume of 39 L. This bin would be integrated in areas where moderate volumes of compost are generated such as lounges and lunch rooms. Due to this wide range of bin volumes, unique bin liner sizes would be necessary for each bin.

In current UBC residential units, residents are given a bin for composting, but it is up to them to decide to use the bin, where to keep their composting bin, what type of bin liner to use if any, and how often to empty and clean their bin (see survey in Appendix C).

The current UBC waste management system has two main parts: composting inside and outside of residence units (Fraser, 2014). Outside of residence units, UBC employees are tasked with emptying the Schaefer USD 35 composting bins. Currently, they do not use bin liners although they have experimented with them (Fraser, 2014). As the bins are normally not full after each day, the UBC employees empty one bin into another in order to minimize the number of bins they have to clean and transport. The bins are then brought to the composting facility where a machine is able to grab these specially designed bins and empty them. The composting facility refuses to take any non-paper bags even if they are biodegradable as they lower the compost quality and can cause problems with the machines (Fraser, 2014).

As part of this report the Triple Bottom Line (TBL) aspects of environment, economy, and society for the bins are considered. For this investigation, the environmental aspects will consist mostly of the environmental impacts of composting, bin liners, and washing bins. With regards to economy, the primary focus will be on the costs of different bin liners. Finally, for the societal aspect, a survey showing UBC residences opinions on composting, bin liners preference, and bin-cleaning feasibility will be covered.

It is important to note that this investigation began with the goal of using TBL on the current bins in use both inside and outside of UBC housing units. However, as the investigation continued, the scope of the research focused in on composting in UBC housing. Due to this shift, the focus of the report will be on composting at UBC residencies such as Walter Gage, Marine Drive, and Fairview.

Section 2.0 Environment

The environmental aspect of this investigation examines the impacts of composting, bin liners, and water use for cleaning bins.

2.1 Composting

Organic waste management at the UBC Vancouver campus incorporates a closed loop system, which implies circulation of food waste and eliminates the need to dispose of food waste in a landfill. This is achieved by collecting organic waste from various residential, dining, and academic facilities and then processing organic waste into compost, which is later used to fertilize gardens on campus (UBC Building Operations, n.d.). Currently, UBC Vancouver processes all its food waste in a composting facility located at South Campus (UBC Vancouver Academic Calendar, 2014). The in-vessel composting facility is capable of processing 5 tonnes daily and produces compost in two weeks (UBC Vancouver Academic Calendar, 2014). The current closed loop composting system is a result of the UBC Compost Project started in 2000 (UBC Building Operations, n.d.) and is a part of UBC's efforts to become a more sustainable campus. It is estimated that 70% of all campus waste can be composted or recycled (UBC Building Operations, n.d.). For example, in 2009 and 2010, 550 tonnes of food waste were processed into compost (UBC Vancouver Academic Calendar, 2014). Providing an easy, affordable, and sustainable way to collect food waste can encourage more people (UBC residents, students, kitchen staff) to choose to compost rather than dispose of compostable waste, thus utilizing the composting system and contributing to campus sustainability.

2.2 Environmental Impacts of Bin Liners and Water Use

The focus of environmental analysis is on environmental impacts of non-plastic liner products (paper, newspaper) and water use for washing the bins. Non-plastic products such as paper based liners or newspaper are a choice, because the in-vessel composting facility cannot process any plastic products, including biodegradable plastic. The environmental impact of non-plastic products such as paper liners and newspaper can be reduced by composting such liners together with food waste. Plastic bags still remain a second popular option among UBC residents with 28% of survey responses stating that they use plastic bags (see Appendix C). In case plastic bags are used in campus housing, one can consider disposing plastic liners separately from food

scraps. To reduce the environmental footprint of plastic bags, it is suggested to wash and reuse them later. Another option would be to avoid using plastic bags at all, since they can be neither composted nor recycled. In this case, one would need to wash the bins every time after emptying them.

Paper based bin liners are typically based on kraft paper, such as *Bag to Earth* and *Bin Fresh Kitchen* liners (Bag to Earth, 2014; Bin Doctor, 2014). In some cases, bags are covered with a thin layer of lining to protect against leaking. Plant based lining materials such as cellulose or polylactic acid (PLA) are able to biodegrade and hence are preferred to petroleum based plastic lining (Tokiwa, Calabia, Ugwu, & Aiba, 2009). Although PLA is made of renewable resources such as corn, manufacturing of PLA can be controversial since one of the major sources for PLA production in the USA is genetically modified corn (Scheer, & Moss, 2008).

An alternative option is to wash the bins instead of using bin liners. This option is popular with UBC residents as 52% of the surveyed sample indicated that they do not use any liners (see Appendix C for Residents Survey results). To evaluate water consumption, one can consider a one year scenario when not using any bin liners. Assuming that it takes 2 to 2.5 L of water to wash a small pail used in residences and assuming that bins are washed at least twice a week, one would need 192 to 240 L of water per year.

Section 3.0 Economy

Currently, the composting bins at UBC housing are not supplied with bin liners. Students are expected to provide their own bin liners. The most common compost bin available at UBC housing is a 7 L “Sure-Close” pail. Based on the UBC student survey respondents living in residency, 56% do not use bin liners. Currently, a big deterrent for students to use bin liners is the fact that bin liners are not provided for students by UBC housing and they are not willing to pay much for bin liners. Through the survey it is found that 24% of the surveyed students are not willing to pay anything for bin liners and 44% are willing to pay between 5¢-10¢ per bin liner. Most students will not likely use bin liners unless UBC housing is willing to provide them.

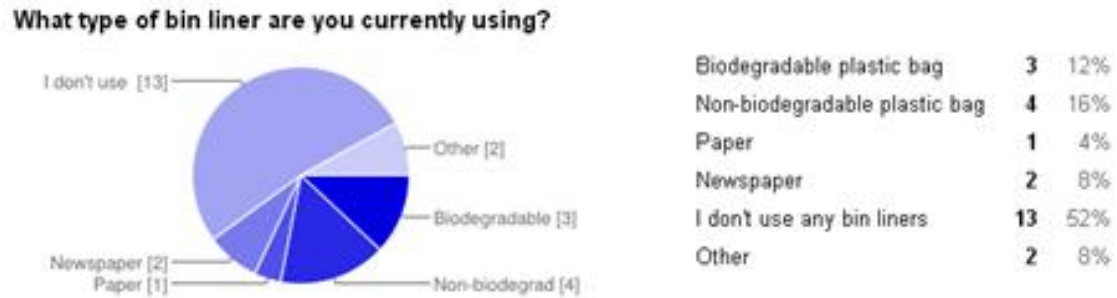


Figure 1: UBC Residents Bin-Liner preference. Source: Residence Composting Survey.

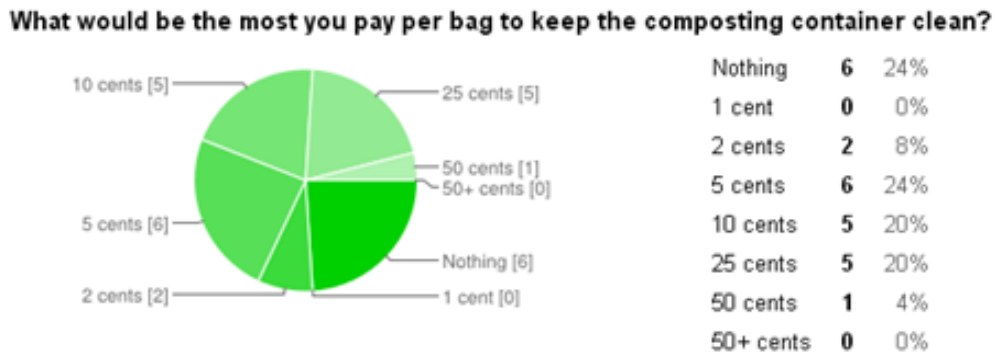


Figure 2: UBC Residents Bin Liner Cost Preference. Source: Residence Composting Survey.

Through the research we looked at multiple bin liner options for the three types of composting bins available at UBC. Four different bin liner companies were selected to look at. Two of which, *Bag to Earth* and *Bin Fresh Kitchen* provide biodegradable paper bags while the

others, *Great Value Compostable bin liners* and *Bag to Nature*, provide biodegradable plastic bags. An advantage of the paper bags over the plastic bags is that they are less prone to leakage and are accepted by the In-Vessel compost system, while a disadvantage is that they don't fit the bins as easily as the plastic biodegradable bags do.

Of the four bin liner companies selected, the most popular and easily accessible (Niagara, 2014) biodegradable bin liners are the *Bag to Earth* bin liners. *Bin Fresh Kitchen* bin liners are more flexible and fit the bins better but are generally more expensive (Bin Doctor, 2014). *Bag to Nature* bin liners are sturdy, water resistant, flexible, biodegradable, and can cover a large range of volumes, but they are expensive compared to other brands (Bag to Nature, 2014). *Great Value compostable bin liners* fit the bins well, are cheap and accessible, but are made of plastic and cannot be put through the In-Vessel compost system (Fraser, 2014).

Table 1 shows the price per bin liner calculated from our price assessment of various bin liner models. Based on the calculations, the cheapest bag for the 7 L pail is the *Great Value Compostable bin liners* at 12.46¢/bin liner, while the most expensive is *Bag to Nature* at 99.95 ¢/bin liner. For a more complete breakdown of the calculations, please refer to Table A-1 for Appendix A.

It is important to note that the only biodegradable bin liner large enough to cover the Schaefer USD 35 green cart that was researched are the *Bag to Nature* bin liners which can cover a volume of up to 300 L. Each bin liner costs around \$1.10 per bin liner, which is more expensive than the range the stakeholders are willing to spend. Large plastic bin liners of 15¢ per bag are available, if the In-Vessel compost can be developed to accept biodegradable bin liners or if the plastic bags are separated from the compost before processing the organic wastes.

Table 1: Price assessment of bin liners

Bin Liner type	Bin Liner Volume Capacity (L)	Price per bin liner (¢/bin liner)
Bag to Earth paper bag liner	7	22.495
Bin Fresh Kitchen Bin Liners – Beige	7	47.14
Great Value Compostable bin liners	7.5	12.46
Bag-to-Nature	11	99.95
Bag to Earth small Biodegradable	9	18.99
Bag to Earth tall Biodegradable	9	24.50
Bin Fresh Kitchen Bin Liners- Green	9	47.14
Bag-to-Nature biodegradable bags	11	99.95
Bag to Earth large Biodegradable	7.5	13.50
Bag to Nature Biodegradable bag	240	110

* Note that the price of each product was found from their respective websites. See Appendix A for more detail.

Section 4.0 Social Impacts

The current composting system on campus is not effective in the way that people use it. This can be attributed to the systems inadequate understanding of the residents as well as residents' level of understanding and commitment to composting. Currently the system makes throwing things away easier than composting which is then what residents do most often as they tend to do what is easiest.

In all residences with kitchens, there is the need for the compost option, but in most cases there is no incentive for people to compost. Most residence units provide a bigger garbage bin, while the Walter Gage residence is equipped with a garbage chute. To better understand the composting situation on campus, we put out a survey spread by social media targeting students in residents. We found that it is much easier for residents to throw compostable material in the garbage as the compost bins are much farther away than the garbage ones.

In order to perhaps make up for this longer trip, residences are given fairly large composting bins. However, if given a large bin, residents are influenced into thinking that they do not need to empty their compost bin until it is full. The survey of residents has shown that residents only empty their bin slightly more often than once a week. This infrequent bin emptying gives plenty of time for the compost to rot, smell, and attract flies. In addition to the smell, a study (Herr et al., 2004) has shown that storing organic waste indoors can cause health risks such as skin rashes. Ultimately, as residents do not enjoy the smell or flies, they choose not to compost at all.

Another disadvantage of the large pails is that they are a bit difficult to clean out as they do not all easily fit in the sink. In addition, due to not being emptied often, the bins become gross, which in turn makes residents even less likely to decide to wash the bins. Therefore, rather than changing the bin size the current system assumes students will alleviate this issue with the use of bin liners. However, from the survey of residents only around 25% (see Appendix C for Residents Survey results) of the sample noted that they actually use bin liners for their compost bin. Most likely this is due to residents not wanting to pay for bin liners as well as bin liners not being easily accessible.

The average amount of money residents say they are willing to spend on bin liners is less than 10¢ per bag (see Appendix C). Plastic bags and some biodegradable plastic bags could both be purchased for this price. Unfortunately, the UBC In-Vessel composting system does not allow

plastic even if it is biodegradable, therefore the system only allows paper bags which cost closer to 50¢ per bag. Due to this dilemma, if residents did decide to purchase bags they would not likely empty the bins often as they would attempt to save money.

Another option besides bin liners to keep the bins clean and the compost from smelling would be to store the compost in the refrigerator or freezer as it slows down the rotting process during that period. From the survey it was discovered that residents have little space in their fridge or freezer, but a bit over half said they would have room for a bin of up to 2 L in either the fridge or freezer. Unfortunately the bins provided are much larger so this does not happen in many residences.

Another way to encourage residents to compost would be to promote UBC's composting program. If all of the people on campus understood the impact composting can have over a long period of time, this might lead to better utilization of the system. However, from the survey almost all residents said they would compost if an acceptable system was put in place so that should be the focus rather than education. (See Figure 3).

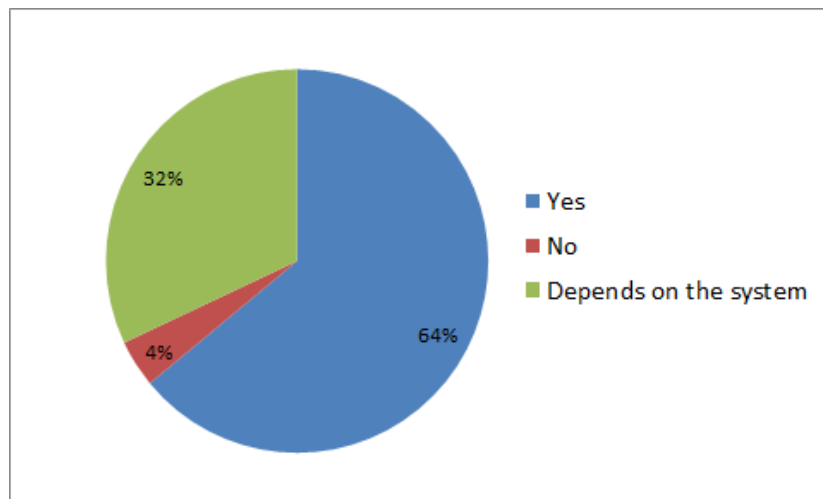


Figure 3: Would UBC Residents Compost? Source: Residence Composting Survey.

Instead of making throwing things away easier than composting UBC could look to other systems such as Vancouver's composting system. Vancouver has the same requirement regarding bin liners, so it is quite relatable. In order to encourage composting rather than throwing things away, the city of Vancouver collects compost every week and garbage every two weeks. Therefore, residences must either compost more or pay for larger garbage bins.

In conclusion, the current system encourages bad composting practices upon residents which in turn causes residents not to compost. The current system promotes garbage over compost and emptying compost rarely rather than often. As compost is not emptied often, it smells, therefore, that combined with the ease of throwing stuff away cause residents to simply throw things away. In addition, the majority of students and staff at campus are not educated on how much composting can make an impact and how to do it properly. Ultimately, composting has to become at least as convenient as throwing things away if it is going to compete.

Section 5.0 Conclusions and Recommendations

This study concludes that most residents currently do not compost but would be willing to if an acceptable system was put in place. Residents on average will not pay more than 10¢ per bin liner, but that would only be enough to cover plastic or some biodegradable bags which are not accepted by the system. 10¢ per bag would not be close to enough to afford the expensive paper bags that are biodegradable. With the current system, residents do not empty their bin often, which causes issues with smell and encourages them to not compost at all. In addition, throwing things away is much more convenient as residences with garbage chutes can throw garbage out without leaving their floors, while to empty compost they must go down to the basement.

Rather than encouraging throwing things away, a good approach would be to follow the lead of the city of Vancouver and make composting easier. It makes sense to collect compost more often than garbage as then people will seek to put organic waste for composting rather than garbage. In addition, garbage is clean and does not rot or smell, while compost does, therefore, it is fine to leave garbage for a longer time. If people find their garbage smells, it is likely because they threw out something that should have been composted. Finally, most often people do produce more compost than garbage.

For residences with garbage chutes like Walter Gage, a recommendation would be to use the chute exclusively for compost. Not only does this encourage emptying the bins more often, it also encourages learning about what can and cannot be composted. To ease in this learning process large labels or posters that detail out exactly what can be composted, recycled, or thrown away would be useful.

If one was concerned that residences would put garbage in the chute anyway despite the posters, additional measures can be taken. One measure would be to place large garbage (and recycling) bins on the floor beside the chute. Therefore, residents would not be tempted to put something in the chute to save themselves a trip. These bins would not need to be emptied often as neither garbage nor recycling goes bad. Whose responsibility it is to empty these bins would need to be decided, but one possibility is having the Residence Advisors manage it either by assigning people to the task or doing it themselves.

Most UBC residents are not likely to pay for bin liners (See Appendix C). Therefore, for paper bin liners to be used UBC housing would likely need to purchase the liners rather than

having students buy them themselves. If bin liners are desired, but the price is too high, another option would be to provide plastic or biodegradable bags and then have a garbage bin right beside the compost bin, so that the biodegradable plastic bag can be discarded without being taken to the In-Vessel compost system. However, not using bin liners at all would have the additional environmental benefit of not requiring bin liners being produced.

A suggestion on developing a solution for the bin liners that fit large Schaefer green carts is to propose a capstone project for senior undergraduate students in relevant UBC engineering departments, such as Civil, Materials, Environmental, or Chemical and Biological departments. This way, a custom design can be created by taking into account all the requirements and constraints to ensure that bins liners are compatible with the campus composting system.

REFERENCES

- Bag to Earth. (2014). *Bag to Earth Bin Liners*. Retrieved from http://bagtoearth.com/eng.buy_our_products.bin_liners.php
- Bag to Nature. (2014). *The Bag to Nature Advantage*. Retrieved from <http://indaco.ca/the-bag-to-nature-advantage.html>
- Bin Doctor. (2014). *Bin liners*. Retrieved from http://www.bindoctor.com/search.php?orderby=position&orderway=desc&search_query=bin+liners&submit_search
- Fraser, B. (2014, February 4). Interview.
- Herr, C. E. W., Nieden, A., Stiliankis, N. I., Gieler, U., & Eikmann, T. F. (2004). Health effects associated with indoor storage of organic waste. *International Archives of Occupational and Environmental Health*, 77, 90-96. doi:10.1007/s00420-003-0489-7
- Niagara Region. (2014). *Acceptable Compostable Bags and Where To Buy Them*. Retrieved from <http://www.niagararegion.ca/living/waste/organics-collection-program-green-bin-and-kitchen-catcher-liners.aspx>
- Scheer, R., & Moss, D. (2008, June 29). Earth Talk. *E - The Environmental Magazine*. Retrieved from <http://www.emagazine.com/earth-talk-archive/week-of-6-29-2008>
- Tokiwa, Y., Calabia, B. P., Ugwu, C. U., & Aiba, S. (2009). Biodegradability of plastics. *International Journal of Molecular Sciences*, 10(9), 3722–3742. doi:10.3390/ijms10093722
- UBC Building Operations. (n.d.). *Composting*. Retrieved from <http://www.buildingoperations.ubc.ca/municipal/waste-management/composting/>
- UBC Vancouver Academic Calendar. (2014). *Composting Facility*. Retrieved from <http://www.calendar.ubc.ca/vancouver/index.cfm?tree=6%2C247%2C866%2C0#15395>
- Winkelman, P. (2014, February 10). Email Message.

APPENDIX A: Bin-Liner Cost Analysis & Availability

Table A- 1: Bin liner dimensions and price for various bin liner types

Bin Type	Bin Liner	Bin Liner Dimension or volume	# of Bin Liners	Price	Price Per Bin liner
 <p>“Sure-Close” small pail 7 L</p>	<p><i>Bag to Earth</i> paper bag liner 7 L</p>	<p>17.5 cm H x 20.9 cm W x 14.6 cm D</p> <p>V =7 L</p>	200	\$44.99	22.49¢
	 <p><i>Bin Fresh Kitchen Bin Liners – Beige</i></p>	<p>V= 7 L</p>	210	\$99.00	47.14¢
	 <p><i>Great value Compostable bin liners</i></p>	<p>41.9 cm H x 42.1 cm W</p> <p>V= 7.5 L</p>	80	\$9.97	12.46¢

	 <p><i>Bag-to- Nature</i></p>	<p>17'' x16''</p> <p>V= 11 L or 3 gal</p>	<p>20</p>	<p>\$ 19.99</p>	<p>99.95¢</p>
<p>Busch KC2000 Approx. 9 L</p> 	 <p><i>Bag to Earth small Biodegradable</i></p>	<p>30.3 cm H x 19.6 cm W x 12 cm D</p>	<p>200</p>	<p>\$37.99</p>	<p>18.99¢</p>
	 <p><i>Bag to Earth tall Biodegradable</i></p>	<p>40 cm H x 19.6 cm W x 12 cm D</p>	<p>200</p>	<p>\$48.99</p>	<p>24.50¢</p>

	 <p><i>Bin Fresh Kitchen Bin Liners- Green</i></p>	V= 9L	210	\$99.00	47.14¢
	 <p><i>Bag-to- nature biodegradable bags</i></p>	17'' x16'' V =11 L/ 3 gal	20 per box	\$ 19.99	99.95¢
<p>Rubbermaid 2957 Wastebasket 39 litre</p> 	 <p><i>Bag to Earth large Biodegradable</i></p>	55.9 cm H x 31.4 cm W x 21.3 cm D	200	\$26.99	13.50¢






<p>Schaefer USD 35 green cart approx. 140 litres</p> 	 <p><i>Bag to Nature Biodegradable bag</i></p>	<p>48''x60''</p> <p>V= 240 L</p>	<p>100</p>	<p>\$110.0 0</p>	<p>\$1.10</p>
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Table A-2: Locations that sell selected Bin-liners


<i>Bag-to-Earth</i>	<i>Bin Fresh Kitchen Bin Liners</i>	<i>Bag-To-Nature</i>	<i>Great Value Compostable Bin Liners</i>
<ul style="list-style-type: none"> ● Canadian Tire ● Dollarama ● Food Basics ● Foodland ● Giant Tiger ● GT French Paper ● Home Depot ● Home Hardware ● Kaumeyer Paper ● Metro ● No Frills ● Price Chopper ● Real Canadian Superstore (Food Waste) ● Rona ● Shoppers Drug Mart ● Sobeys (Food Waste) ● Wal-Mart ● Zehrs ● Zellers 	<ul style="list-style-type: none"> ● Wal-Mart 	<ul style="list-style-type: none"> ● Local retailers ● online 	<ul style="list-style-type: none"> ● Wal-Mart ● Wal-Mart Supercenter

APPENDIX B: Comments on Bin Types & Bin Liners

Table B-1: UBC Vancouver Food Scraps Sorting and Collection Containers. Provided by Bud Fraser, C&CP Sustainability & Engineering. Updated February 3, 2014.

Bin Type	Available Non-Plastic Liners	Comments
<p>“Sure-Close” small pail 7 litre</p>  <p>Notes:</p> <ul style="list-style-type: none"> • Used in most student residence units, and also in the voluntary food scraps program for offices, where small volumes are generated • Must be emptied into the green carts 	<p><i>Bag to Earth</i> paper bag liner 7 L</p>	<ul style="list-style-type: none"> • Not carryable • Paper liners tend to collapse a bit on the sides
	<p><i>Bin Fresh Kitchen Bin Liners - Beige</i></p> 	<ul style="list-style-type: none"> • Thicker, heavy duty liner that can be reused once or twice (this may require a change to existing procedures) • May or may not be carryable • Does not fit bin perfectly – must be folded slightly to fit

<p>Busch KC2000 Approx. 9 litres</p>  <p>Notes:</p> <ul style="list-style-type: none"> • Used in a small number of residence units and offices where small volumes are generated • Must be emptied into the green carts 	<p><i>Bag to Earth</i> small food waste bags</p> 	<ul style="list-style-type: none"> • Not carryable • Paper liners tend to collapse a bit on the sides • May not be available for ordering as of Feb 2014
	<p><i>Bin Fresh Kitchen Bin Liners - Green</i></p> 	<ul style="list-style-type: none"> • Thicker, heavy duty liner that can be reused once or twice (this may require a change to existing procedures) • Perfect fit for this pail
<p>Rubbermaid 2957 Wastebasket 39L</p> 	<p><i>Bag to Earth</i> Large paper bag liner or food waste bag</p> 	<ul style="list-style-type: none"> • See earlier comments on paper liners • Fit is not ideal – probably needs a mechanism to hold the bag open at the top for best results

<p>Notes:</p> <ul style="list-style-type: none"> Proposed future system - this would be integrated within a cabinet for areas with moderate volumes generated – e.g., lunch rooms or lounges Would be collected/emptied by Custodial staff 		
<p>Schaefer USD 35 green cart approx. 140 L</p>  <p>Notes:</p> <ul style="list-style-type: none"> Used to collect from smaller pails and in areas with large volumes generated Moved from inside the building to loading bays, picked up by UBC Municipal Operations Used stand-alone and also within large recycling stations 	<p>None identified</p>	<ul style="list-style-type: none"> Carts are typically washed at South Campus composting facility after tipping into a hopper using a mechanized lifting system

APPENDIX C: Residents Composting Survey & Results

Survey Questions

Which residence do you live in?

- Acadia
- Fairview
- Marine Drive
- Thunderbird
- Totem
- Place Vanier
- Walter Gage
- Other:

Do you personally use the current composting system?

- Yes
- Some of the time, but not regularly
- No

Are you satisfied with the current composting program at your residence?

- Yes
- No

Do you feel like you would compost if an acceptable system was put in place?

- Yes
- Really depends on the system
- No

Do you know what you are allowed to compost?

- Yes
- No

Could you make space in your freezer for a composting container?

- No
- If it is 2L or less
- If it is 4L or less
- If it is 8L or less

Could you make space in your refrigerator for a composting container?

- No
- If it is 2L or smaller
- If it is 4L or smaller
- If it is 8L or smaller

If you have a balcony, would you be willing to store a composting container on it?

- Yes
- No
- I do not have a balcony

How often do you feel you and your roommates would empty the composting bin?

- Every few hours
- Every day
- Every second day
- Every 3-6 days
- Every 7+ days

Would you be willing to compost if you had to wash out the container afterwards?

- Yes
- No

What would be the most you pay per bag to keep the composting container clean?

- Nothing
- 1 cent
- 2 cents
- 5 cents

- 10 cents
- 25 cents
- 50 cents
- 50+ cents

Has your compost attracted flies?

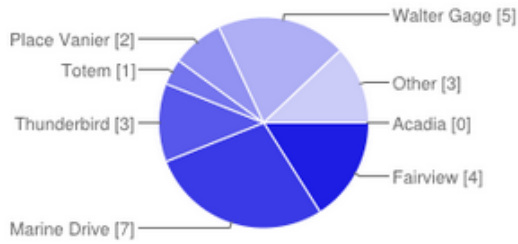
- Yes
- No

What type of bin liner are you currently using?

- Biodegradable plastic bag
- Non-biodegradable plastic bag
- Paper
- Newspaper
- I don't use any bin liners
- Other:

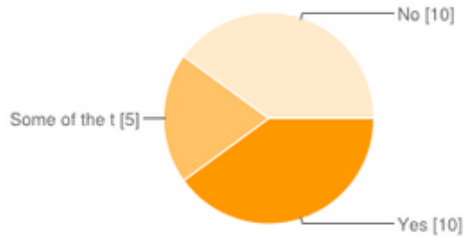
Survey Results Summary

Which residence do you live in?



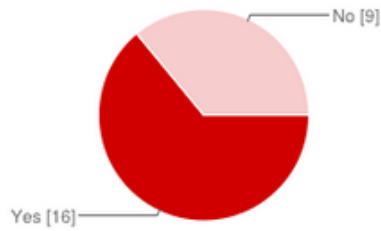
Acadia	0	0%
Fairview	4	16%
Marine Drive	7	28%
Thunderbird	3	12%
Totem	1	4%
Place Vanier	2	8%
Walter Gage	5	20%
Other	3	12%

Do you personally use the current composting system?



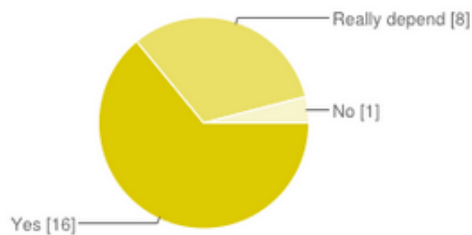
Yes	10	40%
Some of the time, but not regularly	5	20%
No	10	40%

Are you satisfied with the current composting program at your residence?



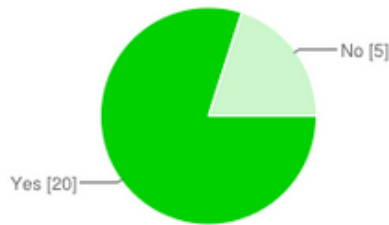
Yes	16	64%
No	9	36%

Do you feel like you would compost if an acceptable system was put in place?



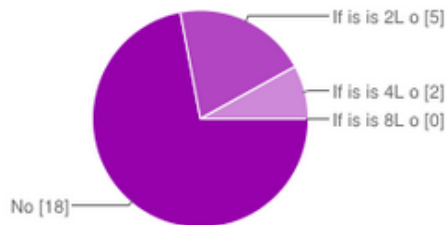
Yes	16	64%
Really depends on the system	8	32%
No	1	4%

Do you know what you are allowed to compost?



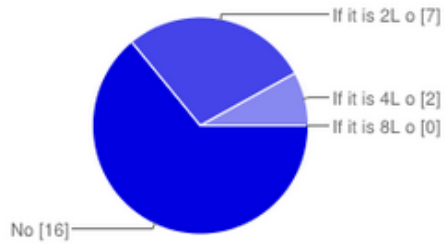
Yes	20	80%
No	5	20%

Could you make space in your freezer for a composting container?



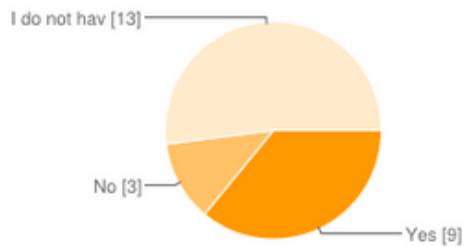
No	18	72%
If it is 2L or less	5	20%
If it is 4L or less	2	8%
If it is 8L or less	0	0%

Could you make space in your refrigerator for a composting container?



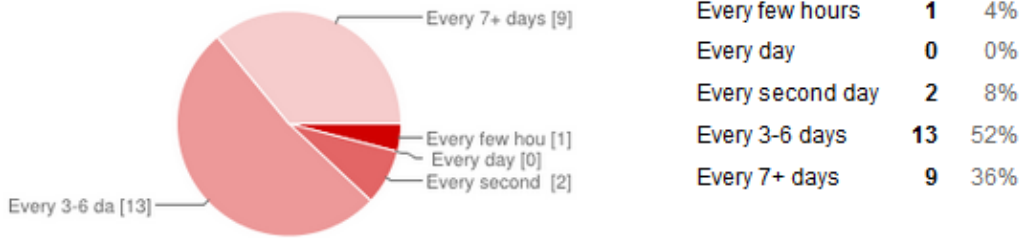
No	16	64%
If it is 2L or smaller	7	28%
If it is 4L or smaller	2	8%
If it is 8L or smaller	0	0%

If you have a balcony, would you be willing to store a composting container on it?

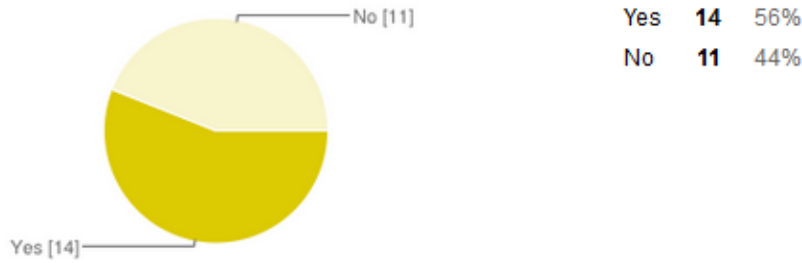


Yes	9	36%
No	3	12%
I do not have a balcony	13	52%

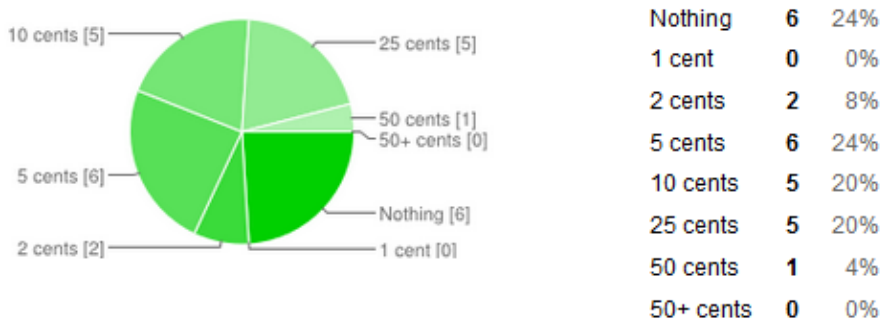
How often do you feel you and your roommates would empty the composting bin?



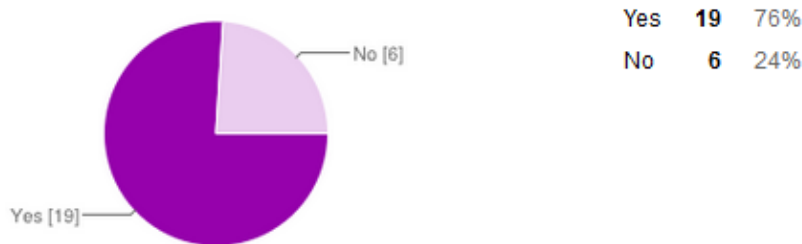
Would you be willing to compost if you had to wash out the container afterwards?



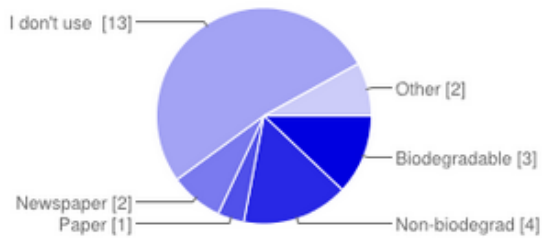
What would be the most you pay per bag to keep the composting container clean?



Has your compost attracted flies?



What type of bin liner are you currently using?



Biodegradable plastic bag	3	12%
Non-biodegradable plastic bag	4	16%
Paper	1	4%
Newspaper	2	8%
I don't use any bin liners	13	52%
Other	2	8%