An Investigation into Plastic Bag Inventory in UBC's Compost and Plastic Alternatives

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University of British Columbia

APSC 262

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An Investigation into Plastic Bag Inventory in UBC's Compost and Plastic Alternatives

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ABSTRACT

UBC aims to be a zero-waste campus through actions toward waste reduction and management. However, one of the challenging problems affecting their goal is compost contamination, particularly plastic bags. Plastic bags have economic and environmental implications on UBC's compost system, however it is uncertain how and why they enter the system. The goals of this report are to determine why plastic bags end up in UBC's compost and what plastic alternatives are available to replace plastic bags through a TBL assessment. In addition, methods to reduce plastic bags in compost are addressed.

The scope of this project is targeted towards the UBC Vancouver Campus. This report will be the first literature written in regards to plastic bag inventory at this campus. Thus, many limitations may affect the results of this report. The project is conducted using primary and secondary sources. Primary sources include consulting the project's stakeholder, Bud Fraser, the City of Vancouver, and conducting a social media survey and on-campus spot check of compost bins. The survey is for social assessment purposes and its scope targets both UBC and non-UBC residence. The secondary sources are journal articles and news articles, which are used to address the economic and environment aspects of the assessment.

Results show that if UBC residents are willing to pay additional cost for plastic alternatives, biodegradable bags are a good alternative economically. This is supported by the survey, where many respondents are willing to pay more for biodegradable bags. However, biodegradable bags produce a significant amount of manufacturing and distribution waste compared to conventional plastic bags despite its short degradation period. Thus, it is a good alternative if these environmental impacts are overlooked. However, based on the survey, respondents believe an awareness campaign on campus is the best solution to reduce plastic bags in compost. Therefore, it is recommended to create an awareness campus at the UBC Vancouver campus.

TABLE OF CONTENTS

LIST OF FIGURES

LIST OF TABLES

GLOSSARY

Term	Definition
Anaerobic	Organic materials in an enclosed vessel are broken down by micro-organisms, in the absence of oxygen (Government of Ontario, 2015).
Biological Oxygen Demand	A measure of the quantity of oxygen used by microorganisms in the oxidation of organic matter (Free Drinking Water, 2015).
Chemical Oxygen Demand	A measure of the capacity of water to consume oxygen during the decomposition of organic matter and the oxidation of inorganic chemicals (Net Industries, 2015).
Particulate Matter	A complex mixture of extremely small particles and liquid droplets (United States Environmental Protection Agency, 2015).
Triple-Bottom-Line Assessment	Measures the company's economic value, "people account" - which measures the company's degree of social responsibility and the company's "planet account" - which measures the company's environmental responsibility (Investopedia, 2015).
Zero Waste	All unwanted products and materials will be treated as resources that can be used again, resulting in virtually zero garbage generated (UBC Sustainability, 2015).

LIST OF ABBREVIATIONS

Abbreviations	Meaning
BOD	Biological Oxygen Demand
COD	Chemical Oxygen Demand
HDPE	High-Density Polyethylene
PE	Polyethylene
PM	Particulate Matter
TBL	Triple-Bottom-Line

SECTION 1.0 INTRODUCTION

1.1 BACKGROUND INFORMATION

In 2011, UBC collaborated with the University Neighbourhoods Association to initiate the Zero Waste Action Plan (UBC Sustainability, 2015). The plan aims to implement actions required to reach new milestones in waste reduction and management in the UBC community. The current focus of the plan targets operational waste and food scraps due to three reasons (UBC Sustainability, 2014):

1. Metro Vancouver will be banning organics from disposal in 2015
2. UBC's waste is composed mostly of organics and recyclables (Figure 1)
3. Opportunity to increase current food scraps diversion practices on campus

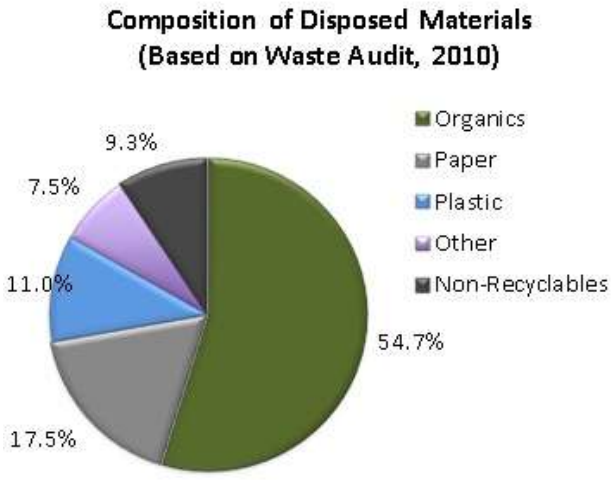

Figure 1: 2010 UBC Waste Audit (Source: UBC Sustainability, 2015)

Figure 2: UBC's In-Vessel Compost Unit (Source: UBC Organic Bins, 2007)

One of the existing programs contributing to the action plan is the UBC Compost Program. This program was created in 2000 to reduce waste through composting as 70% of UBC's waste can be composted or recycled (UBC Building Operations, 2015). In 2004, UBC invested in a large-scale in-vessel compost unit which decomposes organic matter in a mechanized, fully enclosed vessel (Figure 2). The compost produced from this unit is used on campus for landscaping.

1.2 PROBLEM AND PROJECT OBJECTIVES

Compost contamination has been a challenge for the UBC Compost Program as non-compostable items such as plastic bags, plastic cutlery, Styrofoam, etc. are found in the green Food Scrap bin (UBC Building Operations, 2015). Noticeably, plastic bags are the number one contaminant in these bins as a result of UBC not having a soft-plastics recycling program. Plastic bags in the compost system adds significant costs to the composting process. Additionally, the quality of the produced compost and UBC's overall sustainability is reduced. In terms of cost, plastic bags can damage the in-vessel compost unit by clinging onto the unit's metal teeth. As a result, additional labor is necessary to manually remove these bags to prevent damage to the unit. Composting plastic bags have also shown to produce products that are harmful and toxic to the environment.

The main objective of this project is to determine how plastic bags end up in the compost bins. Also, possible alternatives to plastic bags are researched and assessed with the TBL framework. Finally, students will determine methods for reducing/eliminating plastic bags in the compost bins.

1.3 SOURCES AND PROJECT LIMITATIONS

The sources obtained for this project can be divided into primary and secondary sources. The primary sources include a social media survey conducted on UBC and non-UBC residents, emails with the project's stakeholder, emails with relevant manufacturers and companies and various spot checks in compost bins across campus. Secondary sources include journal articles found using relevant search engines such as UBC's Summon and Google Scholar, and relevant news articles.

Appendix A contains copies of the emails with the primary stakeholder, Bud Fraser. The content mentioned in these emails highlights questions and answers between the team and the stakeholder. The following limitations are determined based on the emails:

- The team is not able to arrange a site visit to the compost facility nor speak to a senior operator as staff changeovers were happening during the investigation period. Thus, the team was not able to observe and understand the compost facility and the compost unit.
- No past research related to this topic was conducted. This project will be the first research conducted on this topic.
- Plastic alternatives are based on available literature findings. No lab experiments were carried out to support our findings and discover new ones.
- There is a broad economic scope as anticipated funding on plastic alternatives by UBC was not identified.

SECTION 2.0 ECONOMIC ASSESSMENT

2.1 COSTS OF PLASTIC BAGS AND ALTERNATIVES TO RETAILERS

The first economic indicator that is used to determine the economic viability of plastic alternatives, is the cost of bags to retailers. According to the operators of the UBC compost plant, it is observed that a majority of the plastic bags in UBC compost comes from UBC village. Therefore, the price of plastic alternatives are extremely important in determining their feasibility.

Table 1: Retailer Cost, Average Weight, and Relative Bag Storage Volume (Source: Cadman, 2005)

Type of Bag	Average Cost to Retailers [$cdn/1000 bags]*	Average Weight [kg/1000 bags]	Relative Bag Storage Volume**
Lightweight plastic carrier	$14.03	8.4	1
Fully biodegradable plastic bag	$15.03	6.5	1
Paper, without handles	$93.88	51	8
Paper, with handles	$413.09	124	10

* Data provided by CBC and Symphony Plastic Technologies plc. Based on average price of an average bag in 2005.
** The relative volume of bags to a conventional lightweight bag

Table 1 shows a summary of the cost to the retailers per thousand bags for different bag types. As shown, the lightweight plastic carrier bags are the cheapest, while fully biodegradable plastic bags are slightly more expensive. Comparatively, both paper bags with and without handles are significantly more expensive. Based on these prices, if the UBC village retailers are to switch from traditional bags to plastic alternatives, there is an expected cost increase by 7% if switching to biodegradable bags, 700% for paper bags without handles, and 2944% for paper bags with handles.

The average weight per thousand bags and the relative bag storage volume of different types of bags are also shown in Table 1. Not only are paper bags the most expensive, they are also the heaviest. As shown, biodegradable bags are significantly lighter than paper bags. Additionally, the relative bag storage volume for paper bags are 8-10 times more than regular plastic bags. In

practice, retailers will need more space for storing paper bags, and it requires significant labor to carry them due to their heavy weight. Biodegradable bags are comparable to light weight plastic bags in regards to weight and storage volume. Based on these results, paper bags are not economically feasible while biodegradable plastic bags can be considered as an alternative to plastic bags for UBC village retailers.

2.2 COSTS OF PLASTIC BAGS AND ALTERNATIVES TO CONSUMERS

Another economic indicator considered is the consumer prices of plastic bags and alternatives. Table 2 summarizes the cost per thousand bags from ULINE. The consumer prices compare to retailer prices are an order of magnitude larger for traditional T-shirt plastic bags and biodegradable bags. In contrast, the price for paper bags shows only a twofold increase. The paper bag volume is slightly smaller than that of plastic and biodegradable bags. The prices of all three bags are comparable. Therefore, both biodegradable bags and paper bags are considered as possible plastic alternatives from a consumer's standpoint.

Table 2: Consumer Prices of Plastic Bags and Alternatives (Source: ULINE, 2015)

Type of Bag	Size per bag	Price [$cdn/1000 bags]
Plain T-shirt Plastic Bags	18 x 10 x 30"	$140.00
Biodegradable Plastic Bags	18 x 10 x 30"	$198.00
Paper, without handles	12 x 7 x 17"	$162.00

SECTION 3.0 SOCIAL ASSESSMENT

3.1 SURVEY AUDIENCE

The students created a survey to gather information about public perception of plastic bags and their alternatives as well as their plastic bag disposal habits. The survey is created using SurveyMonkey and distributed amongst social media sites such as Facebook. The first two survey question verified whether or not the respondent is a UBC resident and the second verified if they compost. Of the 76 respondents surveyed, 32% are UBC residents. From these UBC residents, approximately 58.1% composted regularly and 37.21% of these composters have noticed or dispose plastic bags into their compost.

3.2 PUBLIC PERCEPTION FROM SURVEY

The survey additionally informed the respondents of the investigation's problem and asked the respondents why this is occurring. A large majority believes the issue is due to people being lazy and using plastic bags to toss out their compost. Another popular response is people were unaware or ignorant about the harm plastic bags can cause in compost.

To investigate alternatives to plastic bags, the respondents are asked how much additional cost they are willing to pay for a bag which is considered "biodegradable", as shown in Figure 3. Half of the respondents are willing to pay at least $0.10 more for a "biodegradable" bag and only a quarter of the respondents said they aren't willing to pay for additional cost.

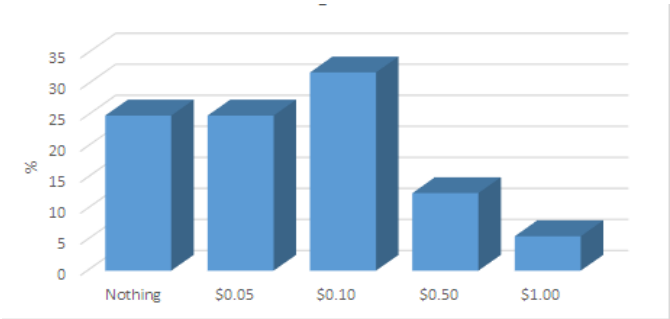

Figure 3: Survey Respondent's Price Range on Additional Cost for "Biodegradable" Bags

The respondents are also asked about their preferences for plastic bags and their alternatives with regards to composting (Table 3). The results show approximately 80% of the respondents agree that plastic bags shouldn't be used for composting. Thus, the public is somewhat aware that plastic bags do not belong in compost and biodegradable alternatives are more appropriate. Many people

are unaware of the Bag-To-Earth Organic Bag. As a result, promotion of this alternative is necessary if it is selected as the most feasible option.

Table 3: Public Perception on Plastic Bags and Alternatives

	Plastic Bag	Biodegradable Plastic Bag	Paper Bag	"Bag-To-Earth" Organic Bag	Compost Container (No Bag)
I would use for compost	5.63% *4*	30.99% *22*	25.35% *18*	7.04% *5*	30.99% *22*
I would use for compost if the bag was provided to me	5.63% *4*	45.07% *32*	12.68% *9*	25.35% *18*	11.27% *8*
I wouldn't use for compost	79.71% *55*	2.90% *2*	7.25% *5*	1.45% *1*	8.70% *6*
I have never heard of it	4.62% *3*	15.38% *10*	4.62% *3*	64.62% *42*	10.77% *7*

*Italicized Numbers = # of respondents for each answer

The survey is also used to determine common locations where plastic bags are obtained. The response are shown in Figure 4. Around 93% of the respondents stated that they receive their plastic bags from grocery stores. Additionally, 56% and 12% of the respondents obtain plastic bags from drug stores and convenience stores respectively. Other areas that respondents receive plastic bags from are bookstores, clothing stores, dollar stores and electronic stores. If biodegradable bags are implemented, these responses can provide an idea of good locations to supply them. Overall, a good location to implement biodegradable bags is the grocery stores.

Figure 4: Common Locations where Respondents Obtain Plastic Bags from

3.3 PUBLIC RESPONSE TO THE ISSUE

The final survey question asked the respondents what they thought is the most appropriate solution to the problem. Almost half of the respondents believes an awareness campaign of the problem is the best course of action. Approximately 27% thought implementing more biodegradable alternatives is the best solution. Almost all of the respondents who selected "other" believes that a combination of these two solutions is most beneficial.

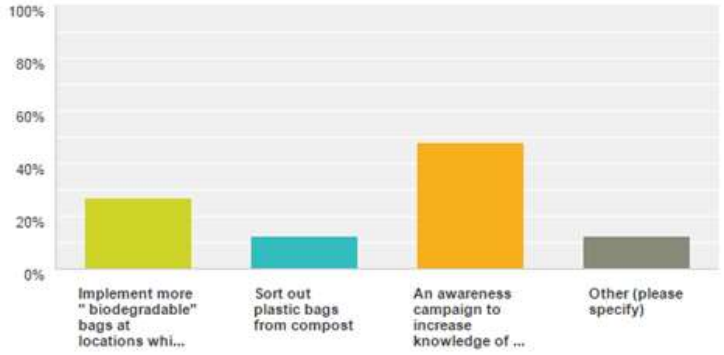

Figure 5: Response for Appropriate Solution to Plastic Bags in Compost

3.4 SPOT CHECKS ON UBC CAMPUS

Throughout the investigation, the students would routinely perform spot checks on compost containers at various locations on campus. These spot checks are performed to gather information on questions such as: How often are plastic bags seen in compost bins? Do the plastic bags contain compost or are they just loose bags? Are there any noticeable company logos on the disposed bags?

Figure 6: Compost Bins at a UBC Residence

When compost bins at UBC residences (Figure 6) are checked, the students often found at least one plastic bag. The plastic bags found in the checked bins nearly always contain compost. Most of the bags seen are from local grocery stores, which supports the survey responses. Bins at non-residence buildings on campus rarely contain plastic bags. This concludes that the plastic bags at the UBC compost facility mostly comes from UBC residences.

SECTION 4.0 ENVIRONMENTAL ASSESSMENT

4.1 IMPACT OF MANUFACTURING

To find all factors applicable in the manufacturing of plastic bags and their alternatives, the students looked at government-based studies due to their greatest access to information as most parts of manufacturing are monitored by government organizations.

4.1.1 ENERGY CONSUMPTION

Table 4: Energy Consumption for Production Plastic Bags and Alternatives (Source: Chaffee & Yaros, 2007)

Type of Bag	Energy Consumption (MJ/1000 bags)			
	Electricity	Oil	Other	Total Energy
Plastic (HDPE)	148	199	162	509
Paper	649	191	1783	2622
Compostable Plastic	325	345	710	1380

Table 4 shows that the least energy intensive bag to produce is plastic bags. Also, nearly six times the amount is required to produce paper bags and three times the amount is required to produce compostable plastic bags.

4.1.2 WATER CONSUMPTION

Table 5: Water Consumption for Producing Plastic Bags and Alternatives (Source: Chaffee & Yaros, 2007)

Type of Bag	Water Consumption (kg/1000 bags)			
	Freshwater	Seawater	Unspecified	Total
Plastic (HDPE)	41	59	111	211
Paper	3,895	1	18	3,913
Compostable Plastic	2,562	3	43	2,607

Similar to energy consumption, producing plastic bags requires less amount of water compared to producing paper bags and compostable plastic bags.

4.1.3 TRANSPORTATION ENERGY/CARBON FOOTPRINT

Table 6: Total Carbon Footprint for Plastic Bags and Alternatives (Source: Symphony Environmental, 2011)

Type of Bag	Total Carbon Footprint Per Bag (grams)	Total Carbon Footprint per bag associated with Transportation (grams)	% Associated with Transportation
Plastic (HDPE)	12.8	0.896	7%
Paper	305	39.65	13%
Compostable, Starch-Based	69	13.8	29%

Table 6 is a summary of the total carbon footprint produced by plastic, paper, and compostable bags based on an assessment done by Symphony Environmental. As shown, both paper bags and compostable bags have higher carbon footprint in transportation than standard HDPE plastic bags. The reason is paper bags are nearly nine times heavier than HDPE bags and take up more space when compacted for transportation. Also, compostable bags need to be stored and moved under specific conditions in order to not compromise the integrity of the bag before it is used.

4.1.4 GAS BY-PRODUCT EMISSIONS

Table 7: Gas By-Product Emissions from Bag Productions (Source: Chaffee & Yaros, 2007)

	Gas By-Product Emissions (kg/1000 bags)		
	Plastic (HDPE)	Paper	Compostable Plastic
CO_2	15.03	5.507	56.6
CO	0.0674	0.121	--
CH_4	0.0633	0.286	0.284
SO_X	--	0.579	--
SO_2	0.0505	--	0.275
NO_x	--	0.264	--
NO_2	0.0454	--	0.304
N_2O	--	--	0.0469
Dust or PM	--	0.128	0.0535
Unspecified Hydrocarbons	0.0231	--	--
TOTAL CO_2 EQUIVALENT AMOUNT	19.2	23.71	89

Table 7 summarizes the major gas by-products emitted from the production of each bags and their respective amount. As shown, based on CO2 equivalent amounts, plastic bags are the best option, followed by paper bags. Surprisingly, compostable plastic bags have almost five times the amount of CO2 equivalent emitted compared to plastic bags.

4.1.5 SOLID AND LIQUID BY-PRODUCT EMISSIONS

Table 8: Solid and Liquid By-Product Emissions from Bag Productions (Source: Chaffee & Yaros, 2007)

	Solid/Liquid By-Product Emissions (kg/1000 bags)		
	Plastic (HDPE)	Paper	Compostable Plastic
SOLID BY-PRODUCTS			
Waste Returned to Mine	0.4444	2.203	0.732
Mineral Waste	0.3337	--	0.433
Slags/Ash	0.189	0.947	3.009
Plastics	0.0536	--	--
Waste to Recycle	--	2.544	--
Waste to Compost	--	1.29	--
Unspecified Refuse	--	0.337	0.1868
Wood Waste	--	0.306	--
Unregulated Chemicals	--	--	0.0964
TOTAL SOLID BY-PRODUCTS	1.0207	7.627	4.4572
LIQUID BY-PRODUCTS			
Suspended Solids	0.0798	0.2265	0.399
BOD	--	0.075	--
COD	0.00541	0.396	0.0598
SO_4^{2-} ions	0.004098	--	0.00629
Cl^- ions	--	0.0104	0.0281
TOTAL LIQUID BY-PRODUCTS	0.089308	0.7079	0.49319

Table 8 summarizes the major solid and liquid by-products emitted from the production of each bags and their respective amount. For solid by-products, paper bags produce the most, but the wastes may not be harmful due to its organic origin. Most of compostable plastic bags' solid by-products are the same as regular plastic bags, but compostable bags produce more waste. Similarly, for liquid by-products, compostable bags produce significantly more of the same by-products as regular plastic bags. Paper bags produce the greatest amount of COD, which increases the chances of algae blooming in water bodies exposed to the waste, which leads to increase environmental damage (Chaffee & Yaros, 2007).

4.2 DEGRADATION RATE OF PLASTIC BAGS AND ALTERNATIVES

The degradation rate of carrier bags depends significantly on the environment that the bags subjected to. Some important environmental parameters affecting the degradation kinetics are humidity, temperature, light intensity, and oxygen presence. For an environment that has low humidity, temperature, light intensity, and/or low oxygen concentration, the degradation rate is low. A landfill typically exhibits these characteristics.

Table 9: Degradation Rates of Plastic Bags and Alternatives (Source: Chaffee & Yaros, 2007)

	Polyethylene (PE) Bags	Paper Bags	Biodegradable	
			Oxo-biodegradable Plastics	Starch-based plastics
Estimated Decomposition Time under Ambient Temperature and Pressure	400-1000 years	400-1000 years (in landfills)	2-12 Months	30-180 Days

Table 9 shows a summary of the estimated decomposition time for four types of carrier bags. Unexpectedly, similar to PE bags, paper bags take 400-1000 years to degrade in landfill. The reason is paper bags degrade very slowly in an environment with low oxygen concentration, light intensity, and humidity. Therefore, the environmental impact of paper and PE bags are similar in terms of degradation rate. Both biodegradable bags have a shorter decomposition time because they can degrade in anaerobic condition, as oppose to paper bags. Based on these result, starch-based biodegradable plastics have the lowest environmental impact in terms of degradation upon disposal.

4.3 COMPATABILITY WITH COMPOST SYSTEM

The current compost system used at UBC is a standard in-vessel system, manufactured by Wright Environmental Management Inc. According to the system's information book, the system is equipped for any paper products. This means it is compatible with any kinds of paper bags. (Wright Environmental Management Inc., 2015). However, this is not true for both conventional

HDPE plastic bags and starch-based alternatives or compostable plastics. This incompatibility is due to the system's mechanical component used for mixing the compost. Also, the system cannot produce the necessary environmental conditions where compostable bags will degrade over time. As a result, paper bags are the only feasible bags that is supported by UBC's compost system.

4.4 POTENTIAL FOR RECYCLING

There are currently 40 retail locations across Vancouver and Northern Vancouver that collect and recycle HDPE plastic bags. However, residents are not aware of them and there aren't a lot of information about these services. For paper bags, the current municipal recycling program deals with the paper products involved in paper bag productions. As for compostable plastics or starch-based bags, there is currently no recycling implemented due to these bags' nature.

SECTION 5.0 ADDITIONAL FINDINGS: EMAIL TO CITY OF VANCOUVER

Besides performing a TBL assessment on plastic alternatives, the team decided to contact the City of Vancouver, who's Green Bin Program is similar to UBC's Compost Program (City of Vancouver, 2015). On their website, they stated that they do not accept any kind of plastic bags in their Green Bins, "even bags marketed "biodegradable" or "compostable"." Appendix B is a copy of the emails with Joanne, who is a 3-1-1 Contact Centre representative for the City. Through contacting her, it was discovered that the City's composting is done by two private companies: Harvest Power in Richmond and Enviro-smart Organics in Delta. Both companies do not process any kind of plastic, even biodegradable or compostable bags as it reduces the quality of the produced compost. They both will classify food scraps in any plastic bag as garbage and direct them towards the landfill; they do not separate the food scraps from the plastic bags. Joanne mentioned it is probably best to contact these companies directly to understand how biodegradable/compostable plastic bags affect the produced compost. The team tried contacting these two companies but was unsuccessful with receiving responses from them. The City recommends using newspaper, paper towels, paper bags, and paper-based liners such as Bag-To-Earth (Bag-To-Earth, 2015) to store food waste. According to Bag-To-Earth, even though some plastic bags are marked as biodegradable or compostable bags, they do not completely disappear and may leave fine plastic particles in the soil. On the other hand, paper bags promotes composting of food scraps by adding necessary nutrients to the process.

SECTION 6.0 CONCLUSION AND RECOMMENDATIONS

For economic assessment, it is concluded that degradable bags are the best alternative to plastic bags in terms of retailer price. Also, both degradable bags and paper bags are considerable alternatives to plastic bags with respect to consumer price. However, both alternatives are considered more expensive for both retailer and consumer prices compared to plastic bags. Overall, if consumers are willing to pay additional cost for plastic alternatives, degradable bags are the best choice.

Through a survey and spot check around UBC campus, it is determined that plastic bags end up in the compost as a result of UBC residents using them for storing and disposing compost. It is concluded that this is the result of laziness or ignorance of the issue. The survey respondents voiced two common responses which are different approaches. The social engineering approach is to implement an awareness campaign, bringing more public attention to the problem. The "technological fix" approach is to replace plastic bags with biodegradable bags at locations where residents can obtain these bags such as grocery stores. Also, through the survey, it is concluded that residents are willing to pay more for biodegradable bags.

In terms of an environmental impact, conventional HDPE plastic bags are considered to be the most resource efficient and has the least impact on the environment in terms of manufacturing and distribution. However, in terms of bag degradation, plastic bags requires a longer duration to degrade. Biodegradable bags may have a shorter degradation period but its manufacturing process produces more liquid and solid waste than plastic bags. Also, in compost, both conventional and biodegradable/compostable plastic bags do not degrade completely as fine plastic particles are left in the compost. This results in compost quality reduction. Paper bags also has a long degradation period if not disposed properly and it has a tremendous carbon footprint from its production and distribution.

Based on the TBL assessment, it is believed that biodegradable plastic bags are the best plastic alternatives. However, based on the discussion with City of Vancouver, two private companies have already advised Vancouver residents not to dispose compostable or biodegradable plastic bags in their compost. The reason is it will affect the quality of their compost. Thus, it is recommended to create an awareness campaign in UBC, similar to the one implemented by City

of Vancouver. This will bring public attention to the UBC community, especially UBC residences, which can lead to a reduction of plastic bags entering the compost system. In addition, it is recommended to start the collection of plastic bags on campus so that it can be recycled and diverted from compost and garbage. Contacting the two private companies composting for the City of Vancouver is a good idea to understand why they do not accept biodegradable or compostable plastic bags.

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APPENDIX A:

EMAILS WITH STAKEHOLDER

Gmail by Google

Andrew Ma <andrewma2012@gmail.com>

APSC 262 Sustainability Project - Plastic Bag Inventory

3 messages

Andrew Ma <andrewma2012@gmail.com> Tue, Feb 17, 2015 at 1:48 PM
To: Bud.Fraser@ubc.ca
Cc: Vincent Kao <vincent80322@gmail.com>, matt1209@ymail.com, William Kemp <kempwilliam94@gmail.com>, SEEDS.coordinator@ubc.ca, "pwinkel@mech.ubc.ca" <pwinkel@mech.ubc.ca>

Good Afternoon Mr. Fraser,

Just to follow up on our last email, we were wondering if you can help us answer a few questions regarding our project, the Plastic Bag Inventory. These questions are:

1. Do you know anyone at the UBC composting plant that we can contact?
2. Has this project been considered in the past? If so, where would be a good starting point for us?
1. 3. We are considering doing a survey on students living in UBC residences, do you think this is a good idea?
2. 4. For the plastic alternatives, are we expected to test the alternatives, or is conducting a literature review enough?
3. 5. How much funding are you anticipating for this project? This may help us reduce the variety of plastic alternatives.

We look forward to hearing back from you and if possible, we would like to meet you in person to discuss more about this.

Thanks,

Andrew Ma
Matthew Galea
Vincent Kao
William Kemp

Fraser, Bud <bud.fraser@ubc.ca> Tue, Feb 17, 2015 at 7:38 PM
To: Andrew Ma <andrewma2012@gmail.com>
Cc: Vincent Kao <vincent80322@gmail.com>, "matt1209@ymail.com" <matt1209@ymail.com>, William Kemp <kempwilliam94@gmail.com>, CCP SEEDS coordinator <SEEDS.coordinator@ubc.ca>, "Winkelman, Paul" <pwinkel@mech.ubc.ca>

Hi Andrew:

Please see my comments below. Let's see if this addresses your questions and go from there – I'm not sure if I will have time for a face to face meeting in the short term.

Regards,

Bud

From: Andrew Ma [mailto:andrewma2012@gmail.com]
Sent: February-17-15 1:49 PM
To: Fraser, Bud
Cc: Vincent Kao; matt1209@ymail.com; William Kemp; CCP SEEDS coordinator; Winkelman, Paul
Subject: APSC 262 Sustainability Project - Plastic Bag Inventory

Good Afternoon Mr. Fraser,

Just to follow up on our last email, we were wondering if you can help us answer a few questions regarding our project, the Plastic Bag Inventory. These questions are:

1. Do you know anyone at the UBC composting plant that we can contact? ARE YOU THINKING OF A SITE VISIT? ARRANGING SITE VISITS MAY NOT BE EASY RIGHT NOW, DUE TO CHANGEOVERS IN STAFF. THERE WOULD NEED TO BE ONE STUDENT GROUP. I WILL SEE WHAT I CAN FIND OUT THOUGH.

2. Has this project been considered in the past? If so, where would be a good starting point for us? THIS IS THE FIRST TIME. IF YOU COME UP WITH SOME IDEAS I CAN GIVE YOU FEEDBACK.

- 3. We are considering doing a survey on students living in UBC residences, do you think this is a good idea? SURVEYS IN RESIDENCES ARE POSSIBLE BUT TYPICALLY NEED TO BE DONE OUTSIDE THE ACTUAL RESIDENCE (E.G., BY STANDING NEAR ENTRANCES OR IN PUBLIC COMMON AREAS). EMAIL SURVEYS ARE GENERALLY NOT PRACTICAL. ANY SURVEY PLANS IN A RESIDENCE SHOULD BE CONFIRMED WITH THE RESLIFE MANAGER THERE.

- 4. For the plastic alternatives, are we expected to test the alternatives, or is conducting a literature review enough? FROM OUR PERSPECTIVE A GOOD LITERATURE REVIEW/DESKTOP STUDY IS FINE – TESTING IS NOT EXPECTED.

- 5. How much funding are you anticipating for this project? This may help us reduce the variety of plastic alternatives. DO YOU MEAN FUNDING FOR YOUR STUDY, OR FOR IMPLEMENTING CHANGES AFTERWARD? IF FOR THE STUDY, THERE IS NO PROJECT FUNDING ATTACHED (TO MY KNOWLEDGE), THOUGH YOU MAY BE ABLE TO APPLY FOR FUNDING FROM THE AMS SUSTAINABILITY FUND IF THE SCHEDULE WORKS (IT MAY BE LATE NOW).

We look forward to hearing back from you and if possible, we would like to meet you in person to discuss more about this.

Thanks,

Andrew Ma

Matthew Galea

Vincent Kao

William Kemp

Andrew Ma <andrewma2012@gmail.com> Wed, Feb 18, 2015 at 5:38 PM

To: Bud.Fraser@ubc.ca
Cc: Vincent Kao <vincent80322@gmail.com>, matt1209@ymail.com, William Kemp <kempwilliam94@gmail.com>, SEEDS.coordinator@ubc.ca, "pwinkel@mech.ubc.ca" <pwinkel@mech.ubc.ca>

Hi Mr. Fraser,

Thanks for replying to my email so quickly. Please see my comments below for additional information about the previous questions.

Thanks again,

Andrew
---------- Forwarded message ----------
From: **Fraser, Bud** <bud.fraser@ubc.ca>
Date: Tue, Feb 17, 2015 at 8:38 PM
Subject: RE: APSC 262 Sustainability Project - Plastic Bag Inventory
To: Andrew Ma <andrewma2012@gmail.com>
Cc: Vincent Kao <vincent80322@gmail.com>, "matt1209@ymail.com" <matt1209@ymail.com>, William Kemp <kempwilliam94@gmail.com>, CCP SEEDS coordinator <SEEDS.coordinator@ubc.ca>, "Winkelman, Paul" <pwinkel@mech.ubc.ca>

Hi Andrew:

Please see my comments below. Let's see if this addresses your questions and go from there – I'm not sure if I will have time for a face to face meeting in the short term.

Regards,

Bud

From: Andrew Ma [mailto:andrewma2012@gmail.com]
Sent: February-17-15 1:49 PM
To: Fraser, Bud
Cc: Vincent Kao; matt1209@ymail.com; William Kemp; CCP SEEDS coordinator; Winkelman, Paul
Subject: APSC 262 Sustainability Project - Plastic Bag Inventory

Good Afternoon Mr. Fraser,

Just to follow up on our last email, we were wondering if you can help us answer a few questions regarding our project, the Plastic Bag Inventory. These questions are:

1. Do you know anyone at the UBC composting plant that we can contact?

ARE YOU THINKING OF A SITE VISIT? ARRANGING SITE VISITS MAY NOT BE EASY RIGHT NOW, DUE TO CHANGEOVERS IN STAFF. THERE WOULD NEED TO BE ONE STUDENT GROUP. I WILL SEE WHAT I CAN FIND OUT THOUGH.

If a site visit is not easy to arrange at the moment, is there a senior staff that we can talk to who has a good knowledge about the plant?

2. Has this project been considered in the past? If so, where would be a good starting point for us?

THIS IS THE FIRST TIME. IF YOU COME UP WITH SOME IDEAS I CAN GIVE YOU FEEDBACK.

3. We are considering doing a survey on students living in UBC residences, do you think this is a good idea?

SURVEYS IN RESIDENCES ARE POSSIBLE BUT TYPICALLY NEED TO BE DONE OUTSIDE THE ACTUAL RESIDENCE (E.G., BY STANDING NEAR ENTRANCES OR IN PUBLIC COMMON AREAS). EMAIL SURVEYS ARE GENERALLY NOT PRACTICAL. ANY SURVEY PLANS IN A RESIDENCE SHOULD BE CONFIRMED WITH THE RESLIFE MANAGER THERE.

We are thinking of doing an online survey via Google Docs, basically using social media to ask people to fill out the survey. We think this is a good idea to get some statistics on people's awareness and use of plastic bags for composting.

4. For the plastic alternatives, are we expected to test the alternatives, or is conducting a literature review enough?

FROM OUR PERSPECTIVE A GOOD LITERATURE REVIEW/DESKTOP STUDY IS FINE – TESTING IS NOT EXPECTED.

5. How much funding are you anticipating for this project? This may help us reduce the variety of plastic alternatives.

DO YOU MEAN FUNDING FOR YOUR STUDY, OR FOR IMPLEMENTING CHANGES AFTERWARD? IF FOR THE STUDY, THERE IS NO PROJECT FUNDING ATTACHED (TO MY KNOWLEDGE), THOUGH YOU MAY BE ABLE TO APPLY FOR FUNDING FROM THE AMS SUSTAINABILITY FUND IF THE SCHEDULE WORKS (IT MAY BE LATE NOW).

Funding for implementing changes afterward. Like say, if UBC residences are considering to provide compost bags (with or without the compost bins), how much are they willing to fund? This will give us an idea for the scope of the project.

We look forward to hearing back from you and if possible, we would like to meet you in person to discuss more about this.

Thanks,

Andrew Ma

Matthew Galea

Vincent Kao

William Kemp

APPENDIX B:

EMAILS WITH CITY OF VANCOUVER

Gmail by Google

Andrew Ma <andrewma2012@gmail.com>

Re: Ask a question : The Richmond Compost Facility

4 messages

info@vancouver.ca <info@vancouver.ca> Wed, Mar 11, 2015 at 8:46 AM
To: andrewma2012@gmail.com

Dear Andrew:

Thank you for contacting the City of Vancouver.

In order to better assist you, is the program available for only residents or are there businesses also participating?

What type of questions do you have for the Green Bin program? 3-1-1 might be able to assist you.

If you require further assistance, please contact us at:

3-1-1 (within Vancouver)
604.873.7000 (outside Vancouver)

We are open to take your call from 7:00 am to 10:00 pm, 7 days/week, 365 days/year (including holidays). We also offer interpretation services in over 170 languages.

We invite you to visit the City of Vancouver's website for further information on City services at http://vancouver.ca

Regards,

Joanne
City of Vancouver
3-1-1 Contact Centre

----- Original Message -----
From: info@vancouver.ca
Sent: 2015-03-10 17:44:34.0
To: info@vancouver.ca
Subject: Ask a question : The Richmond Compost Facility

[q1.0] Part 1: Your message | I want to:
Ask a question
[q1.1] Part 1: Your message | About:
The Richmond Compost Facility
[q1.2] Part 1: Your message | Share details:
Hi,

My name is Andrew Ma. I am a student at UBC and me and some fellow classmates are conducting a study on plastic bag usage in the compost of UBC Residence. The purpose of this project is to find a solution to reduce/eliminate plastic bags used for storing compost when disposing of it and I noticed on your website about the Green Bin Program and how you encourage residences to avoid using plastic bags. I was hoping that I can talk to someone who can answer my questions about the program and other compost related questions.

Thanks.
[photo]
Upload a photo of the issue or service: (Optional)

[q2.0] Part 2: About you | Name:
Andrew Ma
[q2.1] Part 2: About you | Email:
andrewma2012@gmail.com
[q2.2] Part 2: About you | Phone:
5878936328
[q2.3] Part 2: About you | Address:

Andrew Ma <andrewma2012@gmail.com> Wed, Mar 11, 2015 at 10:03 AM
To: info@vancouver.ca

Hi Joanne,

Thanks for getting back to me so soon. Our project is targeted towards UBC Residences only. Thus, there are no businesses associated with this project besides UBC Plant Operation.

Just to clarify, UBC has a compost facility which does all the composting for UBC. Their main concern is that the use of plastic bags for storing compost has pose as an issue as more labor is required to remove these plastic bags prior to composting to prevent damage to equipment. Thus, our client (UBC Plant Operation) would like my group to investigate about possible solutions to target this problem from an economical, social and environmental perspective.

In terms of the City of Vancouver's Green Bin Program, I was wondering how the use of "biodegradable" or "compost" bags can degrade the quality of the compost (as mentioned on the website)? Does the use of biodegradable or compost bags pose as an environmental threat as well? In addition, besides the "kitchen container liner", what other storage alternatives can be used for composting?

Thank you so much again for assisting me with my questions,

Andrew
[Quoted text hidden]

---

info@vancouver.ca <info@vancouver.ca> Wed, Mar 11, 2015 at 11:35 AM
To: andrewma2012@gmail.com

Dear Andrew:

All food waste collected by the City of Vancouver is sent to one of two private composting facilities. They are Harvest Power in Richmond and/or Enviro-Smart Organics in Delta. These facilities discard any food waste in any plastic bag (even those that are typed as biodegradable or compostable) as garbage and is directed to a landfill. They do not separate the food from the plastic bags. It might be best to contact them directly in regards to how biodegradable/compostable plastic bags affect the end product.

The City of Vancouver recommends to use newsprint, paper towels, or paper bags to help contain the food waste. You can also use paper-based liners from local retailers, such as Bag-To-Earth. These bags have a cellulose liner inside that fully breaks down in the composting process. I, myself, have just wrapped up all my food waste in newspaper and have had great success.

Regards,

Joanne
City of Vancouver
3-1-1 Contact Centre

---- Original Message ----
[Quoted text hidden]

Andrew Ma <andrewma2012@gmail.com> Wed, Mar 11, 2015 at 2:41 PM
To: info@vancouver.ca

Hi Joanne,

Thanks again for replying to my email so quick and thanks for answering my questions. This is very valuable information and I really appreciate it. I will contact these compost facilities for other inquiries then.

Thanks again!

Andrew
[Quoted text hidden]