University of British Columbia

Social Ecological Economic Development Studies (SEEDS) Sustainability Program

Student Research Report

Zero Waste and Circular Economy Planning: Innovations in Food Systems

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EXECUTIVE SUMMARY

In 2014 the University of British Columbia developed a Zero Waste Action Plant (ZWAP) with the goal of becoming a zero waste institution and diverting 80% of waste by 2020. Initially, UBC had largely focused on waste diversion through waste sorting from the separation of waste into garbage, recycling and organics. However, this strategy came with many issues. One being the reliance on an individual's knowledge and ability to properly sort waste and unfortunately the 80% diversion target was not met. This project moved away from the diversion approach and focused rather on the approach of circular economies through reusable foodware materials to progress UBC towards being a zero waste institute. The government of Canada defines a circular economy as "a new way of doing business that extracts as much value as possible from resources by recycling, repairing, reusing, repurposing, or refurbishing products and materials—eliminating waste and greenhouse gas emissions at the design stage" (Environment Canada, 2021). This approach allows there to be harmony in finding a balance between environmental and economic sustainability working to prevent waste from happening in the first place.

The overall purpose of this project was to identify the best practices in circular economy planning to propose strategies for UBC's upcoming Zero Waste Action Plan 2030. Part of our research included investigating UBC's small-scale circular economy within the Green2Go reusable foodware program. To fulfil the overall purpose, goals were clearly set to produce viable options to enhance the efficiency of operations in the Green2Go reusable foodware program and provide concrete recommendations to UBC's ZWAP 2030. As the Green2Go program is primarily used among first-year students living in residence, the final goal established was to create an overall culture change around reusable foodware among first year students living in residence. To accomplish these goals, a survey targeted to first-year students in residence was distributed. The data collected help build recommendations for the Green2Go program to further enhance the circular model already established at UBC. By focusing on the first-year population, the project's impact will have lasting effects as they will spend more time on campus from the project's completion date. This focus can allow for a domino effect among future incoming first-years, and eventually the robust culture and awareness of reusable foodware will be widespread among UBC undergraduate students. In addition, the increase of participation in a circular economy through foodware may inspire others to discover other innovations to contribute to UBC's circular economy.

To conduct the research into this topic effectively, Community-Based Action Research (CBAR) was used with a targeted approach focusing on UBC Food Services representatives, UBC policy makers, and first-year undergraduate students. The three key stakeholder groups will be the leaders in the construction of a circular economy at UBC to achieve zero-waste status for years to come. From surveying the key stakeholder group of first-year students, the data was collected using Qualtrics survey platform and analysis was conducted using Excel to produce relevant data to inform on our overall recommendations.

This report identifies the need for improvements to the Green2Go program and strategies to further UBC's stride towards a zero-waste institute. Recommendations are framed in the context of reducing waste as this was found to be the most important step when driving towards zero waste. The key leverage point for the Zero Waste Action Plan is to enhance the presence of a circular economy at UBC through the scaling up of the Green2Go program. Beyond this we recommend that the ZWAP 2030 committee take our discussion questions found under section 4.3 and facilitate dialogue with stakeholders within the various streams of UBC operations to assess value chains opportunities to shift towards a circular model. Recommendations for the Green2Go program specifically can be summarized into more incentives, increased number of return locations, and clear and consistent communication with program stakeholders.

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LIST OF ABBREVIATIONS

BYOC – Bring your own container

GCAP – Greenest City Action Plan

NZWC – National Zero Waste Council

SDG – Sustainable Development Goals

UBC – The University of British Columbia

ZWAP – Zero Waste Action Plan

ZWFS – Zero Waste Foodware Strategy

1. INTRODUCTION

1.1 RESEARCH TOPIC

The University of British Columbia (UBC) has set ambitious targets to progress towards a zero waste institute. The UBC Zero Waste Action Plan developed in 2014 set a goal to diverge 80% of waste from landfills by 2020. However, it was not met. Thus, illustrating a need for innovation to meet future targets.

The waste hierarchy model (appendix A) developed by the National Zero Waste Council (2021) illustrates that to achieve a zero waste system, waste prevention is the highest priority. Followed by maximizing reusables, maximizing recyclables, recovering energy and materials, and lastly minimizing disposal. Thus, this project was focused on waste prevention through the lens of a circular economy. A circular economy has been defined in different words with the underlying theme of a closed loop system in which the inputs are sourced from material that will allow products to hold onto their value for an extended amount of time and to be recycled, repaired, reused, repurposed, or refurbished (Environment Canada, 2021).

Waste is an issue within many operations of UBC. However, this report is focused on the leverage points and opportunities within UBC's food system to take tangible actions promptly. This project focuses on zero waste planning through a circular economy approach to bring innovation to UBC's food system.

1.2 RESEARCH RELEVANCE

One of the desired impacts of this project is to decrease the presence of single use plastics on UBC campus. The reduction of plastic pollution and consumption is a vital step for the success of several of the United Nations Sustainable Development Goals (SDGs). Most notable are:

- SDG 3: Good health and well-being
- SDG 6: Clean water and sanitation
- SDG 11: Sustainable cities and communities
- SDG 12: Responsible consumption and production

- SDG 13: Climate action
- SDG 14: Life below water (protection of the seas and oceans)
- SDG 15: Life on land (restore ecosystems and preserve diversity)

The interconnectedness of plastic pollution's effect on our future shows just how significant of a problem it truly is. Our research aims to aid the shift to reusable plastics on our campus which would help to decrease our total of single use plastics as they are a harmful pollutant to coastal waters (Jambeck et al., 2015). As a coastal community we have an additional responsibility to keep these harmful pollutants out of our surrounding aquatic ecosystems. There are around 31.9 million tonnes of mismanaged plastic waste from coastal communities that can directly enter the sounding waters due to open or insecure landfills. (Eriksen et al., 2014).

In order to address this issue, The City of Vancouver has implemented its own urban sustainability initiative, The Greenest City Action Plan (GCAP). The GCAP consists of 10 primary goals that focus on 3 primary topics: carbon emissions, waste, and ecosystems. Each of these goals within the plan establish measurable targets and different ways in which to gather relative baseline data in order to create effective policies. Our project takes a similar approach and applies it to the reduction of single use plastics within UBCs campus. Through gathering relevant primary data from our survey we can apply changes that benefit needed aspects within the Green2Go program. By getting a more complete picture of how UBC, specifically first year residences, could be contributing to single use plastic pollution we could better approach the problem of reducing our impact as a University.

UBC students make up a significant percent of Vancouver's population and have a responsibility to contribute to the city's urban sustainability goals. Through the creation and implementation of realistic policy recommendations, a collective approach can be taken to create a robust circular economy at the UBC Vancouver campus.

1.3 PROJECT CONTEXT

As previously mentioned, in 2014, UBC established the Zero Waste Action Plan (ZWAP). The ZWAP set the goal to achieve 80% waste diversion by 2020 and a 30% reduction in general waste by 2030 (Zero Waste Action Plan | UBC Campus & Community Planning, 2014). The creation of this ambitious goal led to the development of the Zero Waste Foodware Strategy (ZWFS) in 2019, which focuses on the reduction of single use foodware. Despite great efforts, the goal to divert 80% of waste from landfills by 2020 was not achieved.

In conjunction with ZWFS, UBC's Green2Go program is a reusable foodware program targeted to UBC first-year students. The program was established in 2010, prior to the development of UBC's ZWAP (Green2Go – FOOD AT UBC VANCOUVER, 2021). As part of the first-year residence policy, residents are automatically signed up for Green2Go when they move in and are given a container (Green2Go – FOOD AT UBC VANCOUVER, 2021). Due to the COVID-19 pandemic, less first year students on campus are involved in the program and more single-use containers have been used. UBC Sustainability, which initiated the Green2Go program, wanted to seek areas of improvement to enhance the program prevalence and recover at least 50% of the containers at the end of the school year (Green2Go Campaign, 2018).

The Green2Go program has partnered with UBC Student Housing and Services to ensure students are aware of the program by making it part of the orientation checklist. However, there is still a lack of engagement. UBC Sustainability and UBC Student Housing and Community Services created a detailed campaign for the Green2Go program in 2018. Convenience and operational limitations are some of the barriers mentioned when compared with other university programs. One efficient example of reusable containers is at Oregon State University. The institute offers multiple container return locations, which has successfully reduced around 400,000 disposable containers from the landfill in one year ("Eco2Go food containers", 2021). In contrast, UBC only accepts returns at three dining hall locations.

The system was designed to maximize convenience for students' while reducing waste on campus. The UBC Green2Go campaign observed an increased rate of awareness among first year students since 2013. However, there

remains barriers to participation. The return regulation and distribution policy from other universities' reusable foodware programs are something that can be applied to UBC Green2Go to increase engagement with the program.

Additionally, UBC Sustainability, UBC Student Housing and Community Services, and UBC Zero Waste Committee utilize the Green2Go program to monitor and track campus waste generation to find more efficient ways to reduce waste and encourage students to contribute to the set waste diversion goal (Zero Waste Action Plan, 2021). Green2Go is one of the few driving forces on campus towards zero waste through a circular economy approach. In addition to identifying best practices in circular economies to further UBC towards zero waste through the ZWAP 2030, this project will assess the Green2Go program and provide strategies to reduce waste and enhance the culture around reusable containers.

1.4 PROJECT PURPOSE, GOALS AND OBJECTIVES

Purpose: Identify best practices in circular economy planning to propose strategies for UBC's upcoming Zero Waste Action Plan 2030.

Goals:

- Produce viable options to increase the efficiency of the Green2Go program at UBC.
- Provide tangible recommendations to UBC ZWAP 2030
- Create a change in the culture of reusable food ware at UBC among first year students in residence.

Objectives:

- Distribute a survey to first-year students to gather feedback to make recommendations to strengthen UBC's Green2Go program
- Review circular economy best practices to inform UBC ZWAP 2030 and other plans and policies at UBC.

2. METHODOLOGY AND METHODS

2.1 RESEARCH METHODOLOGY

Research Design

The overarching project purpose for the project was to identify the best practices in circular economy planning to propose concrete strategies for its implementation in the University of British Columbia's upcoming Zero Waste Action Plan 2030. In turn, this overarching would contribute to the goal of producing viable options to increase the efficiency and efficacy of the Green2Go foodware program at UBC. The options will be a culmination of information from primary data collection in combination with secondary literature research and analysis. The options presented will primarily be of benefit to UBC Food Services daily operations and the lives of first year on-campus student residents, as the former implements the program itself, while the latter group are the ones that the program encourages to use the foodware containers while dining in resident dining halls. First-year students are impressionable, as they come into a new environment away from home. While the large number of students is a significant contributor to on-campus waste with the tendency to improperly dispose of it, should the population be properly educated on the means of disposal, it will help UBC achieve their overarching Zero Waste Action Plan 2030.

Research Approach

The most effective way to approach this research was to incorporate CBAR principles and ethics into the design. CBAR, which stands for Community-Based Action Research, is a framework that has been determined to be the best practice used for an ethical and holistic research approach due to the research being guided by cooperation and consensus-making including all key stakeholders from the communities involved or affected. The key stakeholders that should be considered for this project are UBC policymakers, UBC Food Services representatives, and first-year undergraduate students. Policymakers are the ones who will ultimately enact the recommendations and therefore the feasibility of the options presented had to be carefully considered. Additionally, UBC Food Services representatives are an integral part of the implementation of the options enacted by the policymakers and should be on board with the changes to the program. Lastly, it was of the utmost importance the presented options were influenced by first-year undergraduate students, specifically, those who live in first-year residences. This is due to their direct use of the program and the ideal growth it would bring for years to come with a four-year cycle

of incoming first-year students, bringing about a full-scale culture change and attitude to on-campus reusable foodware. Overall, the university's connection to its surrounding communities was considered but was not a significant priority due to the scope of the targeted implementation being those that are directly affected on campus.

Sampling Methods

For the project itself, a representative sampling method to determine the findings was used. By using this method, the student body was represented by the first-year students from on-campus residences who currently use Orchard Commons dining hall, the only first-year residence dining hall that is operational due to Covid-19 prevention measures.

It was important to ensure that the study participants who were sampled gave free and informed consent. To achieve this, recommended language based on the TCPS Principles was used to effectively represent the Behavioral Research Ethics Board's policies. It was also of the utmost significance to provide privacy for the surveyed population, in addition to the protection and confidentiality of their answers. As such, the UBC approved survey platform Qualtrics was used to ensure the data received remained within Canada and followed Canadian Privacy Law. The data was only shared with the researchers from Team 8, the teaching team, and the UBC policy makers so as to advance with the project in the next steps. While raw data was not included in the final report and presentation of the project, summaries and charts were provided through the analysis of the data.

Data Analysis Method

This project required an in-depth analysis of both quantitative and qualitative data. Quantitative data was analyzed and visualized through a variety of analytical tools. Microsoft Excel was the main statistical analysis software used to obtain basic statistics for the dataset. Later, Tableau was used to visualize and further interpret results through the use of pie charts and graphs. Qualitative data was provided through the implementation of an open-ended question in the primary data collection and sorted by the use of Excel software so results could be

more easily interpreted. Retrospective data on the level of resident participation with the program aided in determining whether there is an increase, decrease, or neutrality to the levels, which will be discussed later on in the report.

2.2 RESEARCH METHODS

This project had three main avenues of data collection. The first was to review historical Green2Go program data, followed by implementing a survey targeted to the first-year residence while simultaneously reviewing programs at similar institutions to Green2Go at UBC. An additional literature review was conducted to articulate circular economy best practices. These methods were implemented to get a baseline understanding of the program, get direct feedback from students currently participating in Green2Go to identify gaps within the program, and based on the gaps identified, and apply feedback to guide the literature. Together, these methods led to evidence-based solutions to address gaps within the Green2Go program. Each technique is described in more detail below.

Historical Data

Historical data was obtained from Paula Mccready, Senior Procurement Officer at UBC Housing Services. This data set ranged from September 2018 to February 2019 and September 2019 to February 2020. The data sets included information on uses of Green2Go discount, number of students enrolled in the program, replacements of Green2Go containers, marketing methods used for the program, and purchasing data for disposable containers. This was used as guided for survey questions.

Survey

Primary data was collected using the Qualtrics web-based survey platforms. This was administered to first year students living in residences with a target of 50 responses. In total, 66 responses were received. Students were targeted for the survey via first year Facebook groups (e.g., Math 101 Study Group, UBC Science Class 2025, etc.) as well as other UBC clubs and organized (e.g., Greek organizations, Varsity Outdoors Club, etc.). Survey respondents could opt into a drawing for a chance to win three $25 gift cards, which was used as an incentive to encourage participation. Canva was used to create visuals for survey distribution and Microsoft Excel was used for

initial data processing and visualizing trends in survey responses.

Literature Review

The purpose of the literature review was to assess best practices and well-functioning programs similar to Green2Go within other institutions. For this reason, the literature review targeted "reusable containers programs" within universities, the goal was to identify what functioned well within these programs. Additionally, a second literature review was conducted to evaluate circular economy "best practices and principles" to obtain a rudimentary understanding of waste diversion and prevention.

2.2.1 SECONDARY DATA COLLECTION RESEARCH METHODS

To understand why student engagement and response rate to the Green2Go program were lower than expected, similar programs at other universities were assessed. To achieve this, search engines such as Google, Bing, Yahoo, and Baidu were utilized. Additionally, project clients at UBC Sustainability and Engineering and UBC Student Housing and Community Services also provided relevant data on the Green2Go program.

UBC Sustainability and Engineering and Student Housing and Community Services provided access to the program overview and campus campaign plan, historical data on student participation, the number of Green to Go containers lost in a year, and the number of students dining in versus taking food to go in residence dining halls. These campaign plans and quantitative data were essential to analyze to find the gap within the program. The campaign plan provided a look into the current marketing strategy of Green2Go towards first-year students. The insight gathered from these documents and helped articulate what further research would be needed to address the project's desired outcomes.

To search for programs similar to UBC's Green2Go, the following considerations were taken: the campus size, first-year student population, the presence of a sustainability plan for the university, and the sustainability goal of the city where the university is located. The inclusion criteria for universities had similar or greater than values of the above criteria compared to UBC. An AI website was used to calculate the frequency of words on

websites related to these two topics, then used those frequently appearing words to create the list together during group meetings. Keywords including but not limited to green, sustainability, reusable container, dining hall, cafeteria, zero waste, upcycling, reduce waste, food waste; and abbreviations such as Bring Your Own Container (BYOC).

Since reusable container programs across university campuses were assessed during the height of COVID-19, most of the programs researched are currently not in use. We have tried to find foodware campus-wide campaigns from other universities' websites; unfortunately, no information regarding the overview or program plan was available online.

As for the review on circular economy best practices and policies, we began by familiarizing ourselves with the definition of "circular economy" by using those keywords. Upon diving into the literature, we found that different organizations had different definitions yet kept the same themes. Because of this, we decided to hone in on the Canadian context of circular economies. Keywords such as "Canadian circular economy strategies", "Canadian circular economy best practices", and "Canadian circular economy initiatives" were used.

2.2.2 PRIMARY DATA COLLECTION RESEARCH METHODS

The primary data collection method consisted of a targeted survey to gather both quantitative and qualitative data. Using UBC's Qualtrics platform, a ten question survey (appendix B) was created, targeting primarily first-year undergraduates who frequently dined at Open Kitchen, the Dining Hall in Orchard Commons -- the only location offering the Green2Go program due to COVID-19. This targeted approach was essential to reduce the number of responses from those not participating in the Green2Go program.

2.3 METHODS OF ADMINSTRATION

Survey Recruitment

As mentioned in section 2.2 the primary method of recruitment for the survey was first year oriented Facebook groups, as well as UBC club and organization groups. A "blurb" describing the surveys/projects purpose

were included along with the posting. This resulted in the survey being distributed amongst 25 Facebook groups. The time and group posted in was kept track of in a team spreadsheet. These groups were monitored by team members to ensure the posting was viewed and interacted with.

Survey timeline and facilitation

The survey was opened and initially posted in the Facebook groups on March 16, 2021 and was kept open by group Members until March 29, 2021. Responses were monitored daily by team members to ensure that the survey was targeting the correct population -- first-year students dining at Open Kitchen.

Data Collection Rationale

A web-based Qualtrics survey was selected as a mechanism of survey delivery as it allowed respondents to answer in a stress free-manner on their own time. This method ensured no violations to the British Columbia public health order to maintain physical distancing because of the COVID-19 pandemic. Additionally, administering a survey provided a secure platform for responses and efficiently transferred to Microsoft Excel. The Facebook group recruitment method was selected to have access to more students in a contactless manner. The two-week timeline was selected to obtain an adequate sample size.

3. RESULTS

3.1 PRIMARY DATA RESULTS

3.1.1 GREEN2GO PROGRAM ANALYSIS

A total of 66 response were collected from the survey. Figure 1 illustrates survey questions five and nine which were “Are you aware of the Green2Go program?” and “How did you hear about the Green2Go program?” respectively. Figure 2 illustrates survey questions seven and eight which were “Have you ever thrown away a reusable Green2Go container?” and “Have you ever repurposed a Green2Go container?” respectively. Data from the survey can be found under appendix C.

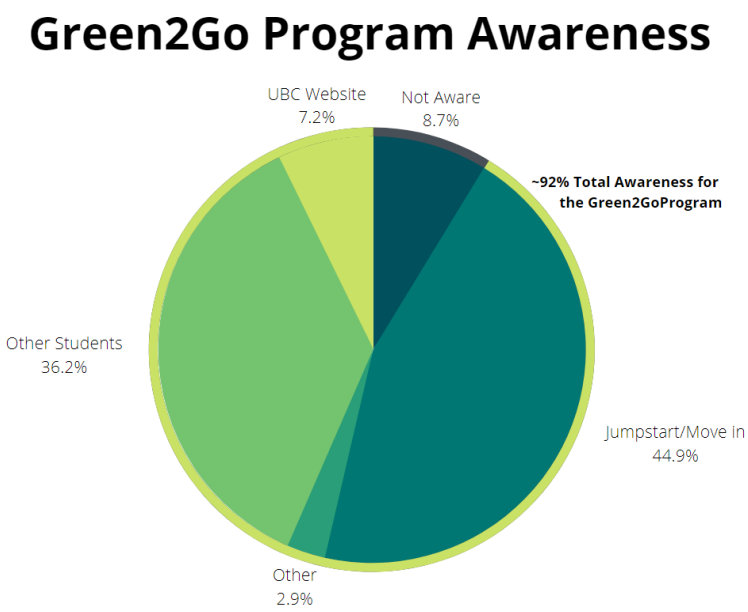

Figure 1 : Green2Go program awareness

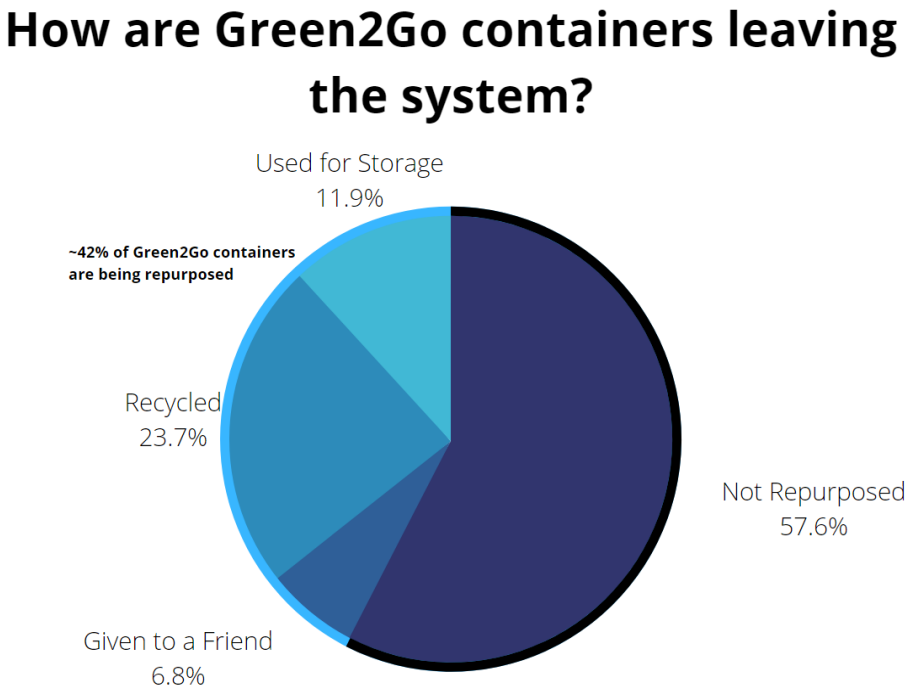

Figure 2: Green2Go container use

3.2 SECONDARY DATA RESULTS

3.2.1 REUSABLE FOODWARE PROGRAM COMPARISON

Table 1 summarizes our findings of programs similar to UBC Green2Go and highlights the key difference among the found program and Green2Go.

Table 1

Institute	Program Name	Program Overview	Number of undergraduate students enrolled at the university	Key Difference	Source
Harvard University	Reusable Container Program	The reusable container program begins with students on a meal plan receiving a token from an ID checker, which is then exchanged for a meal in a properly sized container. The used container is then brought back and exchanged for another token.	7,148	HU allows students to not have to wash out or clean the container before returning. It allows for proper sanitation to occur with less container loss.	https://green.harvard.edu/tools-resources/how/reusable-container-program https://www.niche.com/colleges/harvard-university/
Tulane University	OZZI reusable program	Student register for the program at the beginning of the year, where they receive a token to receive their meal in an OZZI container. The used container is then placed in an OZZI machine and prepped for	7,260	TU employs the use of a full-service program which minimizes congestion and enables students drop off their containers in a machine that aids in the organization and flow of the program.	https://diningservices.tulane.edu/explore/OZZI-program https://www.niche.com/colleges/tulane-university/

		cleaning while the machine dispenses another token.			
Oregon State University	Eco2Go program	Students order food to go and receive it in an Eco2Go container. Once finished, students are expected to empty, rinse, and dry the container before returning it to any UHDS restaurant.	18,554	OSU has built up the infrastructure of the program to be much more robust and holds the advantage of having many, many more return locations on campus for containers.	https://uhds.oregonstate.edu/eco2go https://www.niche.com/colleges/oregon-state-university/

3.2.2 CIRCULAR ECONOMY BEST PRACTICES

The key themes within circular economy best practices were divided into the following: business model, product design, and stakeholder engagement. The best practices and examples of how those can be translated into policies are presented in table 2.

Table 2

Theme	Best Practices	Policy Examples	Further Details
Business model	Examine risks and opportunities	Mandate annual reviews of programs and plans Have newly developed programs and plans reviewed by an external accredited body Financial incentives to transition business models	National Zero Waste Council Circular Economy Business Toolkit
	Analyze value chain opportunities		
	Analyze business model options		
Product design	Design for attachment of the user	Include X number of people from the target population in the design process	How are circular products designed?

		Conduct product testing with X users from targeting population prior to ordering supply	Adapted from Products that Last
	Design for durability	Products entering the system must withstand the pressure of X Pa	
	Design for compatibility		
	Design for ease of maintenance and repair		
Stakeholder Engagement	Inspire behavioural change	Incentive opportunities	Advancing the Concept of the Circular Economy in Canada
	Increase transparency awareness around waste management	Municipal responsibility as waste diverging systems differs across cities	

Table 3 pulls directly from the Circular Economy Business Toolkit prepared by the National Zero Waste Council (2016) to describe business model options.

Table 3

Circular Supply Chains	recycled, recyclable or renewable materials are used as inputs instead of nonrenewable resources, lessening dependence on scarce resources and reducing waste
Product as a Service	replace ownership models with usage models, such as selling driving time instead of cars. This encourages companies to maintain products for longer and offers new services, such as long-term repair and maintenance
Products Life Extension	extend the lifecycle of products and assets through repair, upgrade, remanufactured or remarketing
Sharing Platforms	use digital technologies to maximize the use of underused assets and increase the utilization rate of products by making possible shared use, access, or ownership. Hotel rooms, vehicles and consumer goods are examples. According to Accenture, 80 percent of typical household items are used only once a month
Recovery and Recycling	recover useful resources from disposed products or by-products. Some companies already re-use 100 percent of the waste generated at their manufacturing plants

4. DISCUSSION

4.1 GREEN2GO PROGRAM ANALYSIS

One of the key findings from the survey was that the barriers in the Green2Go program were generally surrounding the physical functioning of the program (i.e., availability of containers, places to wash containers) rather than awareness. The survey indicated that 90% of respondents were aware of the Green2Go program, and responses suggested that Orchard Commons had effective communication methods to share information with students. The majority of students said they heard of the program through orientation programs or details were communicated to them by other students. However, 42% of respondents indicated that they had recycled, thrown away, or repurposed (leaving the program's system), indicating that students were not necessarily utilizing the program for its intended function. Additionally, several comments were made about inadequate return procedures and how containers are always running out at busy times and right after breaks. These issues guided the review of other programs to aid in developing recommendations.

4.2 REUSABLE FOODWARE PROGRAM COMPARISON

The following section will analyze reusable foodware programs at three different locations in North America - Harvard University's Reusable Container program, Tulane University's OZZI program, and Oregon State University's Eco2Go program. The analysis will highlight the factors that make each program effective, followed by how those factors can be implemented to create a positive change in the Green2Go program at UBC. Each University's program offers something unique to benefit its students, whether through financial or efficient means.

The first University foodware program that will be assessed is Harvard University's Dudley To-Go Reusable Container program. One of the most well-known and respected Universities across the globe, Harvard implemented its program in the fall of 2013, emphasizing reducing unnecessary waste and encouraging a new culture of reusability on campus and in student's daily lives (Stoll, 2013). The program is available to graduate and undergraduate students who participate in a meal plan and offer four locations for container distribution and return. The necessary steps for program utilization are comprised of the following: initially receive a "token" from the ID checker, then turn in the token at one of the four food services locations to get your lunched packed in a

reusable “clamshell” container, followed by the container’s return and the user receiving another token to be used for their next meal (Sustainability at Harvard, 2021). It is worth noting that the step of individual users rinsing out the containers has been eliminated. Instead, the food services staff handles the cleaning of all containers to ensure the proper sanitation steps are followed. It has been estimated that approximately 75% of the student body has been actively using the program, while 25% utilize disposable boxes (Stoll, 2013). The factor that differentiates this program from the rest is the ability for students to immediately return the containers without the requirement to clean them. This differentiation not only eliminates the one extra step students would have to accomplish before returning the container but provides a sanitary and time-effective approach to the process as a whole.

The second University foodware program that will be examined is Tulane University's OZZI program. While the OZZI reusable foodware system has been implemented across healthcare, military, and university institutions, Tulane joined in early 2014. The program itself functions as an intermediary step between students and staff, where students initially register for the program at the beginning of the year. Students that register receive two tokens to exchange one with food services staff to obtain an OZZI container. Students can make this exchange at three different locations. Once a meal is finished, students return the used and dirty container into the OZZI Machine, which sorts the containers and prepares them for washing and sanitation by staff while giving the student back a token (Cross, 2017). Between 2014 and 2017, the OZZI program prevented over 20'000 single-use containers from entering landfills (Cross, 2017). Although details about the overall number or percentage of participants in the program were unavailable, some key findings can be drawn. For starters, it reduces person-to-person interaction and eliminates the need for wasted time properly sorting the containers. Secondly, it allows students to choose a variety of sizes for the containers, meant for solid or liquid food such as sandwiches and soups, respectively. Most notably, in light of COVID-19, Tulane University decided to halt the OZZI program. There was too high a risk of congestion as students would be in close proximity returning their containers and would not maintain social distancing (Tulane Dining Services, 2020). While the program comes with a significant upfront price tag, once

implemented, it can decrease costs by over $70,000 compared to the purchase of single-use containers annually (OZZI Program, 2021).

The final university foodware program that will be evaluated is Oregon State University's Eco2Go Food Container program, which by far in large is the best example of the ability to successfully implement and run a reusable foodware program on a university campus. The program offers 23 distribution and returns locations scattered around campus, both indoor and outdoor (Eco2Go food containers, 2021). While no date could be provided on the year of the program's establishment, it has a relatively streamlined process similar to the other institutions. When a to-go order is placed, it is offered in an Eco2Go container. The expectation is that students empty the container, rinse and dry it, then return the container to one of the many locations available (Eco2Go food containers, 2021). Similar to UBC's Green2GO, there is a discount for users of the Eco2Go container. With the use of an Eco2Go container, the consumer would receive 20 cents off each meal. However, much like Tulane University, the program is currently suspended in light of COVID-19. It is estimated that Eco2Go was able to keep 400,000 disposable containers from the landfill in the first year the program was initiated. While this reusable foodware program features the additional steps of requiring students to rinse and dry the containers before returning them to a location for sanitation, the multiple return sites and discount incentive each meal makes their program appealing.

To conclude, while all three programs feature a variety of factors that could be of potential benefit to the University of British Columbia’s Green2Go foodware program, the highlights can be found to be a monetary incentive to use the containers such as at Oregon State, a seamless transition for container return through intermediary machines such as OZZI at Tulane, and the efficiency for students of not having to clean their containers before the return at Harvard. Such factors will enable UBC’s Green2Go program to be more effective and efficient.

4.3 CIRCULAR ECONOMY BEST PRACTICES AND POLICIES

4.3.1 BUSINESS MODEL

The transition to a new business model can be daunting. The following are key components to transitioning business models towards a circular framework that can be done all at once, or step by step over time. The three key components are to examine risks and opportunities, analyze value chain opportunities, and analyze business model options. The Circular Economy Business Toolkit prepared by the National Zero Waste Council (2016) suggests when examining risks and opportunities, these five themes should be the focus of the discussion and examples of questions to consider:

- Linear Economy Risk
    - What is our exposure to resource scarcity, a rise in commodity prices and environmental regulation over 3 – 5 years and 10 – 15 years?
- Value Chain Opportunities
    - What value could we recover from products we have sold for the last 5 years?
    - If we had to take back all the products we sold, how would that affect design and production?
- Customer Value Creation
    - What is the real value of what we deliver to customers and how can we create more value while rethinking how we deliver it?
- Technology and Industry Innovation
    - What is the potential to disrupt our business model through technology trends including science, engineering, and digital technologies?
- Business Benefit
    - What benefits can be realized in the short and long term?

When considering how to maximize value chain opportunities within a business model, it is critical to understand the monetary value of the existing waste stream (NZWC, 2021). From there, each stage of the value chain should be assessed with the following questions in mind:

- From the waste generated by the required inputs, could it be useful to others or monetized?

- Why are products ending up in the landfill? Is it attributed to the functionality or users interest?

After the risks and opportunities are evaluated, the focus can shift towards business model options. There is no one size fits all approach. Companies that make products will have different approaches than those in retail and distribution. Each model can offer unique opportunities to implement strategies towards the values held within a circular economy.

4.3.2 PRODUCT DESIGN

When considering the design of a circular product the following are key elements to be considered: user attachment, durability, compatibility, ease of maintenance and repair, adaptability and upgradability, recyclability. When developing a new product or redesigning an existing one, considering the users attachment to it is essential to keep the product within the closed loop system of a circular economy. Ultimately, it is up to the consumer to determine how the product serves their needs and how to dispose of it when it no longer does. Thus, it is good practice to involve the targeted audience of the product into the design process and quality testing to ensure the product remains in the circular system.

Notably, the consumer will only utilize the product as long as the product maintains its function. Therefore two questions to consider in the design process. One, how can the longevity of the product be increased? This refers to the durability of the product itself and the compatibility with other systems. The second question to ask is how can the product be repurposed once it no longer performs its function? This will involve extensive thought regarding the ease of maintenance and repair, adaptability and upgradability, and recyclability.

4.3.3 STAKEHOLDER ENGAEMENT

To fully experience the benefits of a circular economy, stakeholders must be engaged. Engagement is essential to create conditions for effective collaboration and helps gain insights (NZWC, 2021). Collaboration is needed among suppliers, distributors, retailers, waste managers, customers and others to keep used products, components and materials in circulation (NZWC, 2021). As a part of stakeholder engagement, there needs to be

increased transparency around cities' waste management. Within the BC context, different municipalities have different qualifications for recycling and organic collection. By highlighting these differences, there is an opportunity to heighten interest in consumers for circular products through simplifying strategies to divert waste from landfills.

5. RECOMMENDATIONS

5.1 RECOMMENDATIONS FOR ACTION AND IMPLEMENTATION

5.1.1 GREEN2GO PROGRAM RECOMMENDATIONS

As previously mentioned in the analysis of the survey data, 42% of respondents did not use the Green2Go reusable containers for their intended purpose. We recommend that dining hall staff and Green2Go container distributors in residences are informed of the container return process and frequently share that information with participants to encourage consistent returns of containers. Additionally, we recommend that the Green2Go program coordinators emphasize the importance of returning containers to the first-year residence eight weeks before the end of the current term as the lack of available containers towards the end of the semester was a common issue survey participants mentioned.

Through the analysis of other reusable foodware programs at post-secondary institutes, we found an excellent opportunity to increase the Green2Go program efficiency by increasing the number of return locations. We suggest that additional return locations be installed on campus where there is high traffic, such as the AMS Nest and Irving K. Barber Library. Increasing the number of return locations will not only increase the number of containers returned but also grasp the attention of others who are not participating in the Green2Go program.

Currently, the only motivation is a 20 cents discount when participants use their Green2Go container. We recommend that the Green2Go program coordinators implement additional incentives to encourage people on campus to utilize the Green2Go program. Through the implementation of additional incentives, the culture around reusable foodware at UBC will grow stronger. For instance, a loyalty card for Green2Go. For every ten meals participants use the Green2Go container, they will be rewarded a free item from any UBC Food Services.

Apart from incentives, we encourage the Green2Go program coordinators to find the best method to communicate the accountability model within the Green2Go program. Many students are not aware that they can return their Green2Go container for an eight-dollar refund.

5.1.2 UBC ZERO WASTE ACTION PLAN 2030 RECOMMENDATIONS

The UBC Zero Waste Action Plan (ZWAP) 2030 is a powerful tool to create large-scale change at UBC. We recommend that the ZWAP 2030 committee collaborates with those who developed the ZWFS to up-scale the Green2Go program. This goal can translate to a target for ZWAP 2030. For example, by 2025, UBC Food Services will reduce the purchasing of single-use food ware by 25% by providing Green2Go containers at all UBC Food Services outlets and have a return location within. Alternatively, the initial focus of up scaling the Green2Go program can be through collaboration with the Alma Mater Society (AMS). The AMS Nest is a building that attracts a high number of students, staff, and visitors with many dining options. Whichever direction, we recommend that the ZWAP 2030 committee consult with the UBC Board of Governors Sustainability Committee for advice and input.

As for circular economy best practices, UBC has initiated a start by banning plastic straws and charging for single use foodware. However, as mentioned at the beginning of this report, when trying to reduce waste, the action that takes the highest priority is reducing waste itself. We recommend that the ZWAP 2030 committee focus their efforts on assessing where in the value chains of UBC operations waste can be reduced rather than associated with a tax or higher cost.

5.2 RECOMMENDATIONS FOR FUTURE RESEARCH

The initiative behind this project primarily focused on how to incorporate and promote reusable foodware to reduce single use plastic waste on UBCs campus among students living in first year residences. Limitations in this study that prevented further research mainly consisted of a reduced rate of first years living on UBC campus due to COVID-19 safety precautions. Future research into this issue should include a larger scope to see how initiatives such as Green2Go could be applied on a campuses-wide level. Barring this campus-wide approach, repeating this

first-year based study in subsequent years could provide additional data that could have been missed due to the limitations described.

6. CONCLUSION

In summary, for UBC to progress towards a zero waste institute, it must focus on reducing waste itself. Establishing a circular economy is an excellent way to reduce waste. It is a model consisting of a closed-loop system with inputs generated to hold onto their value for an extended amount of time and be recycled, repaired, reused, repurposed, or refurbished. This project has identified many opportunities to enhance the presence of a circular economy at UBC. Opportunities within the UBC Green2Go program include an increased number of return locations, program incentives such as a loyalty card (buy ten get one free), and clear communication around the self-accountability of the program. Moreover, the Zero Waste Action Plan 2030 is an excellent tool to up-scale the progress seen with the Green2Go program. There is room for collaboration among the Zero Waste Action Plan committee, the Zero Waste Food Ware committee, and the UBC Alma Mater Society to implement a campus-wide Green2Go program to advance UBC towards a zero waste institute. To conclude, the transition towards a circular economy does not have a one-size fits all approach. As a student project, this report has laid the groundwork to initiate meaningful conversation within stakeholder groups of UBC to identify what action makes sense within their respective value chains. We look forward to seeing what impact our findings will have at UBC.

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APPENDICES

Appendix A: Waste Hierarchy Model

(National Zero Waste Council, 2021)

Appendix B: Survey used to collect primary data.

This survey is apart of a LFS 450 *Land, Food, and Community III: Leadership in Campus Food System Sustainability* project. Our project is designed to help inform the upcoming UBC Zero Waste Action Plan 2030.

Please only fill out this survey if you are a **first-year UBC student living in on-campus student housing**.

Note that this survey is anonymous. Survey participants will be available for $20 gift cards drawing by the time we close the survey.

Q1. What is your gender identity?

Male

Female

Non-binary / third gender

Prefer not to say

Q2. How old are you?

under 18

18-19

20-22

23-25

25+

Q3. What Residence are you in?

Orchard Commons

Totem Park

Vanier

Other

Q4. What percent of your meals do you have at Open Kitchen?

0%

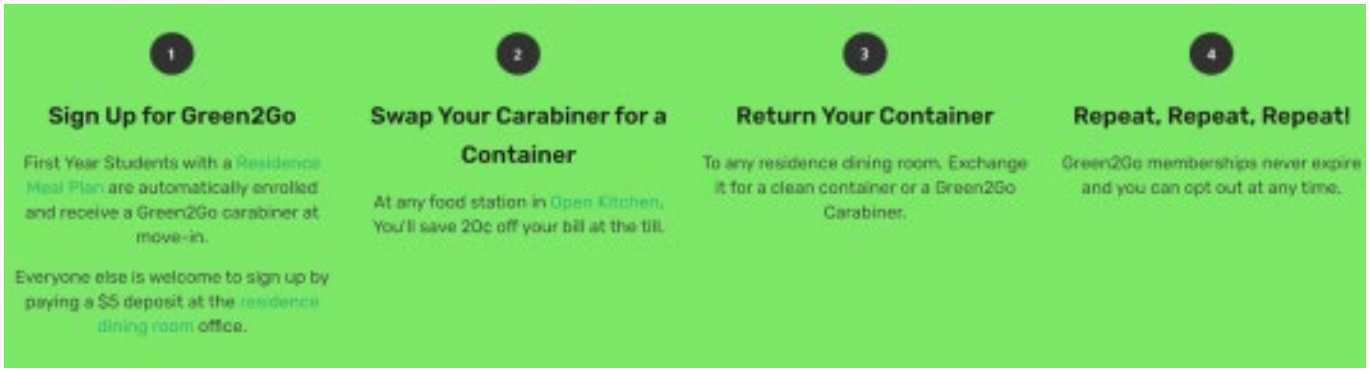
1-25%

26-50%

51-75%

76%+

The following questions will refer to UBC's Green2Go program (pictured below). If you are unfamiliar with the program, visit https://food.ubc.ca/green2go/ for further details.



Q5. Are you aware of the Green2Go program?

Yes

No

Unsure

Q6. When purchasing a meal from Open Kitchen how often do you use the Green2Go container?

0

1-2 days per week

3-4 days per week

5+ days per week

Q7. Have you ever thrown away a reusable Green2Go container?

Yes

No

Unsure

Q8. Have you ever repurposed a Green2Go container?

Yes, recycled

Yes, gave it to a friend

Yes, use it for storage

Yes, other

No

Q9. How did you hear about Green2Go program?

Jumpstart/ Move in

UBC website

Other students

I haven't heard of it

Other

Q10 Is there anything else you want to add?

In order to be eligible for entry into the draw for 3 $20 gift cards, please provide the following information

Name

Email

Powered by Qualtrics

https://ubc.ca1.qualtrics.com/Q/EditSection/Blocks/Ajax/GetSurveyPrintPreview?ContextSurveyID=SV_7Qx5RDJCgpSTwZU&ContextLibraryID=UR_c…

Appendix C

Click here to be directed to the survey data.