

Final Report
Group 7
Food Waste Rangers

GEYS4010 College Senior Seminar
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Group Member



Table of Contents

1. Background information	2
2. Objectives	2
3. Methodology	2
3.1. Waste Collection Scheme	2
3.2. Visiting O · Park1	3
3.3. Survey	3
4. Result	4
4.1. Pilot Scheme	4
4.2. Full Scheme	5
4.2.1 Observation during monitoring	5
4.3 Survey	6
4.3.1 Pre-survey	6
4.3.2 Post-Survey	7
4.4 O · Park1 Tour	7
5. Impact	8
6. Possibility of continuation	8
6.1 Discussion with Wu Yee Sun college	8
6.2 Discussion with Social Responsibility & Sustainable Development Office (SRSDO)	9
7. Improvement	9
8. Conclusion	9
9. References	10
10. Exhibit	11
A. Data Collected from the Pilot Scheme	11
A1. Table and Bar Chart	11
A2. Calculation of total amount of daily food waste generated from WYS pantries	12
A3. Value Estimation	12
A4. Some Pictures of Food Waste Separation	12
A5. Food Waste Thrown at a Purple Bin	12
A6. Poster	13
B. Pictures of the O · Park1 Journey	13

1. Background information

Food waste is one of the big crises in Hong Kong as the landfills nearly reach their maximum capacity, together with being a source of greenhouse gas. In 2021, around 3400 tonnes of food waste was sent to landfills every day (*Food Waste Challenge*, n.d.). To address unavoidable food waste, the Hong Kong government launched a scheme on food waste collection and recycling at facilities to encourage residents to practice separating their food waste so that it can be properly collected and recycled (*Food Waste Challenge*, n.d.). The food scrap will be collected, delivered, and transformed into other useful materials such as energy and compost at O · Park1.

2. Objectives

1. To raise awareness among college students about the food waste problem, its impact on the environment, and how they can contribute to addressing the issue.
2. To enhance waste management practices by introducing food waste bins. A focus is to encourage the college team to adopt this implementation in the future and to extend our efforts across the campus.
3. To be a part of creating a greener society and saving the planet.

3. Methodology

3.1. Waste Collection Scheme

We conducted a food-waste collection scheme at all Wu Yee Sun student pantries. We first conducted a pilot scheme from 5th to 11th October at E5's (Male) and E7's (Female) pantries to evaluate the feasibility and value of this project.

Every night, our members set up a trash bin with a biodegradable bag to collect food waste at the pantries. The food waste bin is placed near the trash bin, with a poster showing the types of waste allowed for recycling (See Exhibit A4). Our members would talk to the students on the correct procedures for separating food waste and answer any questions.

We discussed the implementation of the full scheme with WYS staff members. With approval, the full scheme was conducted from 29th October to 19th November (Four weeks) every Sunday to Thursday. Every week, we include three more pantries and assign three members to monitor the new pantries from 6:00 PM to 8:30 PM. A promotional message was also sent to the WhatsApp groups of each floor. Pantries that had already undergone supervision will not have a monitoring student and the bins will remain at the pantries throughout the day. All waste was collected at 8:30 PM every day and disposed of at the food waste bin outside of the canteen (See Exhibit A5). The schedule was as follows:

The Week	The newly added floor
First week	E2/F, E3/F, E4/F
Second week	E6/F, E8/F, W2/F
Third week	W3/F, W4/F, W5/F
Fourth week	W6/F, W7/F, W8/F

Figure 1. The table describing the newly added floor in each week

At the end of the scheme, all residents would have at least one week of access to the food waste bin.

3.2. Visiting O · Park1

O · Park1, located in northern Lantau Island, is the only food waste processing facility in Hong Kong (*O.Park*, n.d.). It handles 200 tonnes of food waste daily by turning it into compost and electricity (*O.Park*, n.d.). We organized three tours in English, Cantonese and Mandarin for WYS students in November and December and welcomed 15 participants in total.

The tour, offered by the government, encompassed a detailed walkthrough of the facilities key areas through interactive activities. Participants observed firsthand the transformation of food waste into biogas and compost, gaining insights into the practical aspects of waste management and recycling.

3.3. Survey

To evaluate the success of our project, we distributed surveys during and after the end of our scheme and visits. We included questions on the procedures for separating food waste and their willingness to use our food waste bin. 18 and 11 students answered the first and second survey respectively.

We presented the survey and collection scheme data to WYS college staff and CUHK's Social Responsibility and Sustainability Development Office (SRSDO).

4. Result

4.1. Pilot Scheme

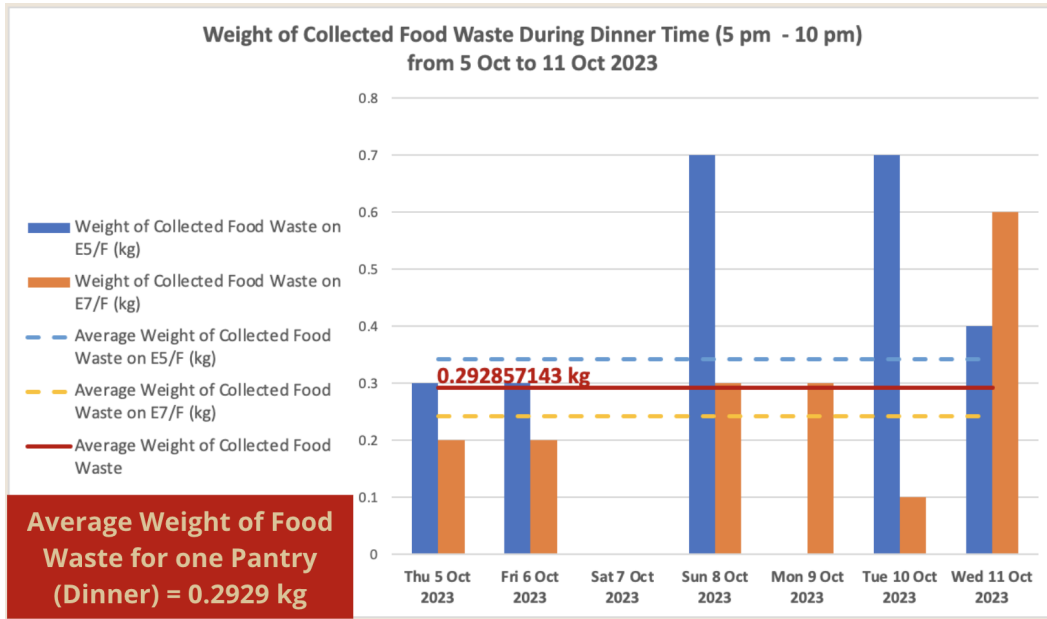


Figure 2. The chart describing the weight of food waste during the pilot scheme

The average weight of food waste per pantry from 5pm to 10pm is 0.2929 kg, so the total amount per day is around 10 kg. Since 1 kg of food waste can generate 0.2 kWh of electricity at O · Park1 (*Food Waste Challenge*, n.d.), $0.2 * 10 = 2\text{kWh}$ -electricity can be created.

***The full result and calculation can be viewed in Exhibit A. Data Collected from the Pilot Scheme.

4.2. Full Scheme

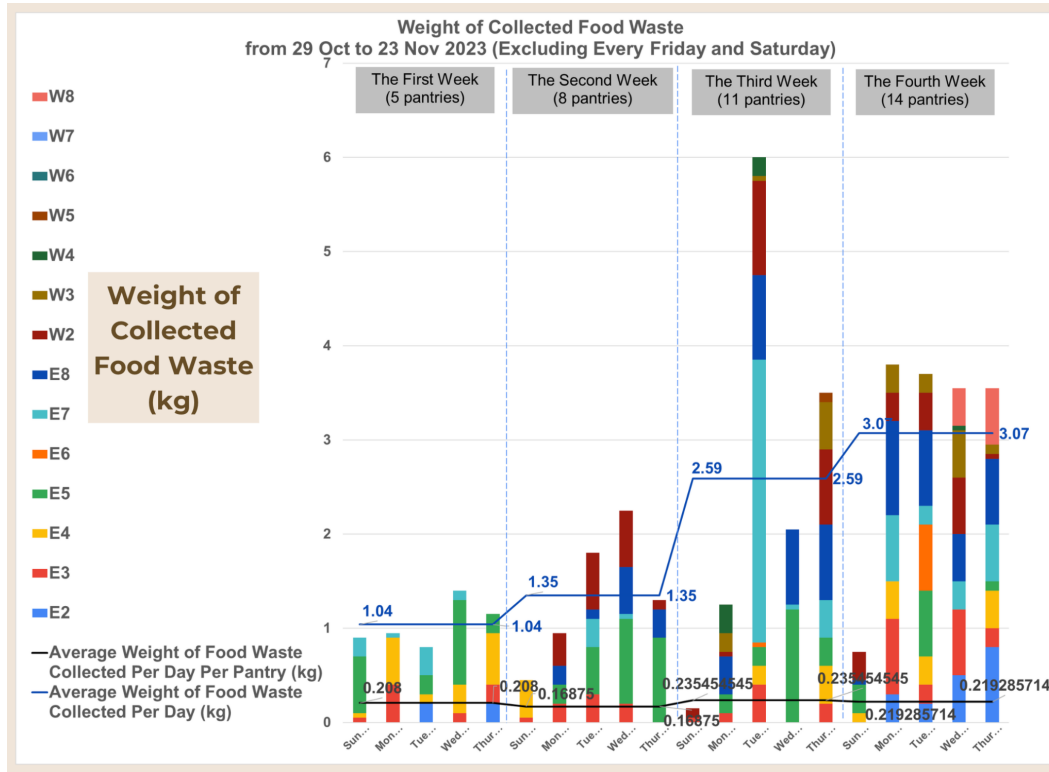


Figure 3. The chart describing the weight of food waste during the full scheme

The average weight of food waste per pantry per day was around 0.2 kg, which was reduced from the pilot scheme (0.2929kg for only dinner time). In the last week, we collected food waste of 3 kg per day from all 14 pantries, which is less than what we expected earlier at 10 kg. One possible factor is that the scheme period is near the final exam period when fewer people cook. However, the daily generated energy would be $3 * 0.2 = 0.6$ kWh if the daily food waste amount is 3 kg.

4.2.1. Observation during monitoring

Out of 185 records, we found improper waste, such as plastic bags and hard materials that microorganisms cannot digest, for only two times. Although some people did not notice food waste bins before, they willingly separated food waste after being informed. Unfortunately, not everyone separated food waste. Potential reasons will be discussed later.

*** The collected data can be viewed from this link:

https://mycuhk-my.sharepoint.com/:x/g/personal/1155147542_link_cuhk_edu_hk/EayT2xuzS4dLqyak5c8ksdgBwmSLzfcmgz0zPz4167Jk4Q?e=AeK3r7

4.3. Survey

To understand more about residents' opinions, we conducted surveys prior to and after our full scheme.

4.3.1. Pre-survey

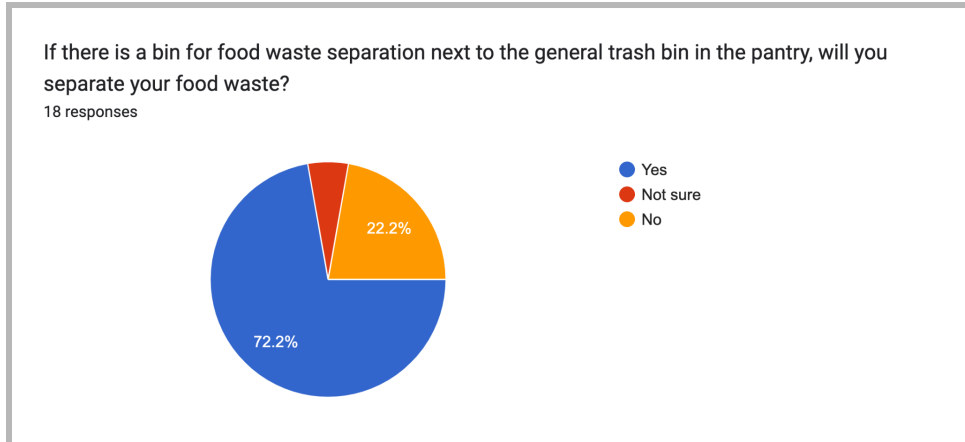


Figure 4. A pre-survey question about interests in separating food waste of WYS residents

From the pre-survey, most people (72.2%) showed the intention to separate food waste.

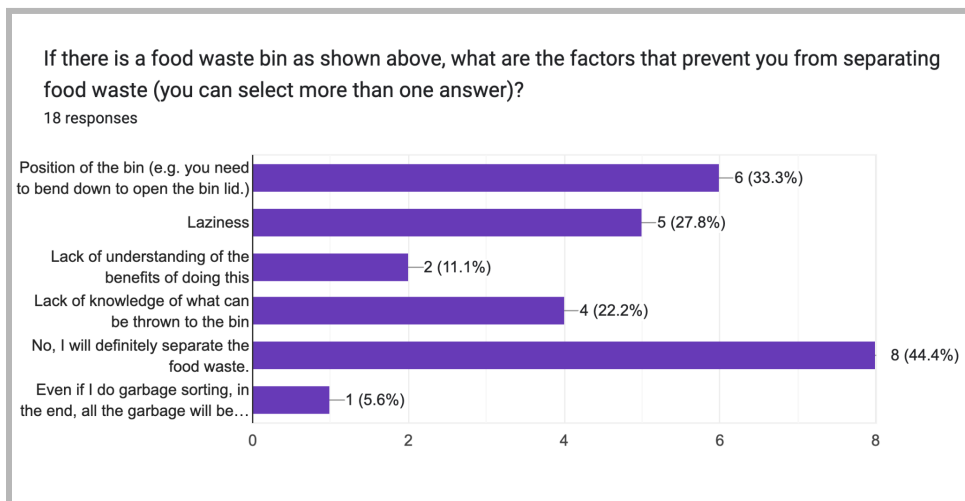


Figure 5. A pre-survey question about the factors preventing WYS residents from separating food waste

The top three factors preventing people from separating food waste are 1) inconvenient location of a bin (such as bend down position), 2) laziness, and 3) lack of knowledge of what can be thrown. 1) and 3) can be solved by putting bins on the chair if there are sufficient chairs in the pantry and attaching posters regarding food waste recycling steps next to the bin for better understanding.

Among the comments, someone was worried that food waste might be mixed with non-recyclable waste later, rendering waste separation unbeneficial. We provided the details of

where the waste will be delivered to and handled via WYS floors' WhatsApp groups to address their concerns.

4.3.2. Post-Survey

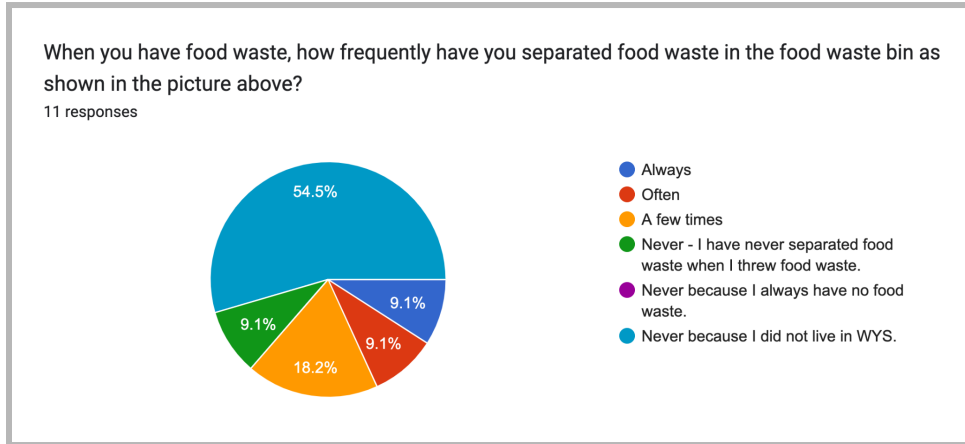


Figure 6. A post-survey question about the frequency of the food waste separation of the participants

After our implementation, only 9 percent always put their food waste in the provided food waste bin, showing that additional solutions are required for improvement.

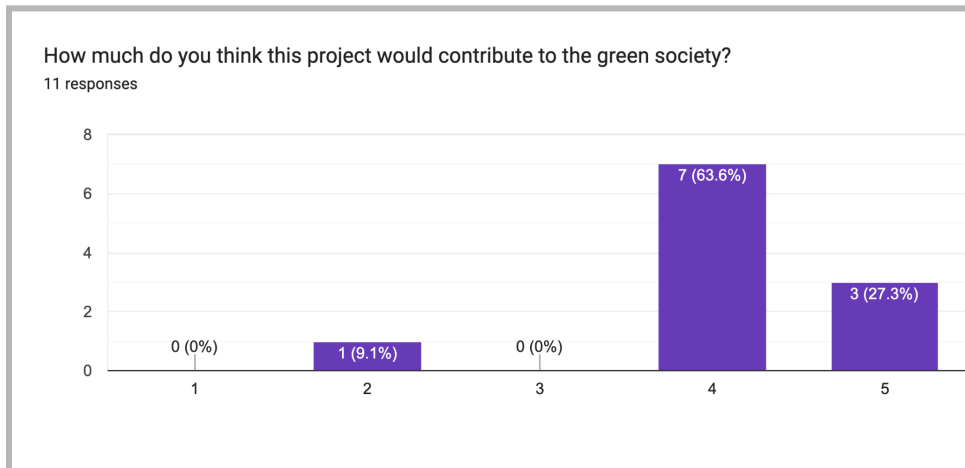


Figure 7. A post-survey question about the opinions towards the value of this project to the green society

However, most respondents perceive this project could contribute to a green society. Although further enhancement is needed to encourage more people to have habits of segregating food waste, this project is an initiation to improve food waste management and collect data for WYS and other colleges to consider the continuity of this project.

4.4. O · Park1 Tour

The tour of O · Park1 significantly resonated with the 12 participants, sparking a newfound appreciation and understanding of sustainable practices. The visitors, primarily WYS students and college members, were particularly impressed by the practical application of technology in

transforming food waste into energy. This leads to a realization of the tangible impacts of recycling and sustainability efforts by them.

Several participants shared that the tour had a profound effect on their perception of environmental responsibility. They felt more informed about the complexities of waste management and the innovative solutions available.

The interactive nature of the tour is reflected by the engaging photographs (See Exhibit B). These images captured moments of learning and demonstrated the tour's success in not just educating but also uniting participants under a shared vision of a sustainable future. The feedback was unanimous in its praise for the inspiring nature of the tour. The interactive parts inspired a sense of personal responsibility, with many expressing a commitment to reduce their own food waste and to be more conscientious about recycling.

5. Impact

Through this scheme, we have successfully collected 40.25 kg of food waste, which has the potential to generate 8.05 kWh of energy. While this may not seem like a significant amount of energy, we firmly believe that this scheme holds immense potential for long-term impact.

In addition to its energy generation capabilities, the initiative has also played a crucial role in raising awareness and educating college students about the pressing issue of food waste, its detrimental effects on the environment, and the ways in which they can actively contribute to addressing this problem.

Furthermore, we are delighted to announce that this scheme has brought about a transformative shift in the behaviors of Wu Yee Sun residents. Previously, due to the lack of conveniently-located food waste bins in the college hall, the separation of food waste was not promoted effectively. However, thanks to our scheme's implementation, residents have now embraced the habit of separating food waste in their pantry, ensuring a more sustainable approach by reducing future friction.

By combining energy generation, education, and behavior change, this scheme has laid the foundation for a more sustainable future, and we are excited about the potential it holds for further positive transformations.

6. Possibility of continuation

6.1 Discussion with Wu Yee Sun college

Upon the completion of the one-month scheme of bin set-up, our group arranged a meeting with Ms. Evelyn, a Wu Yee Sun officer, to present our results and to discuss the possibility that Wu Yee Sun College will continue a sustainable practice of separating and managing food waste in the future. The college officer expresses support for our project and intends to present our proposal during an upcoming meeting with the management-level team for further discussion.

Since the implementation involves manpower and resources, it may take a longer time for consideration before approval by higher-level college administrators. An additional factor that the college is concerned with is the improper handling of food waste segregation by college residents. There is an opportunity that the implementation might not take place in the next semester; however, positive feedback showcases the importance of our initiative and potential adoption in the future.

6.2 Discussion with Social Responsibility & Sustainable Development Office (SRSDO)

We got positive feedback from SRSDO. They clearly see the increasing amount of food waste being recycled which is a convincing result to them. Besides, they mentioned that it is good that we do all the procedures by ourselves from promoting and raising awareness to implementation of the scheme. Moreover, they think there will be a huge positive impact if this program can be implemented for the whole campus and they will pass the message to other colleges.

However, there are some challenges. First is the lack of a disposal facility that will be transported to O · park. Besides, we should ensure that there will be students to take over the program and run it. They mentioned that it would be good if there is cooperation from the college to let the cleaning staff help dispose of the food waste bin.

They suggested that we can also promote the purple bin to students so that they can dispose of the food waste by themselves and if the students are interested in doing a project about sustainable development like this project SRSDO does offer funding.

7. Improvement

We observe that there are many things that we can improve. The bin can be bigger and the filter component should be included as some students suggested. To raise awareness, we can explain more about the benefits of our project through WYS email. Besides, we can create different versions of posters that are easier to understand. Moreover, we can prepare more equipment such as bins, hand gloves, and posters in case any group of students wants to continue our project and for future implementation.

8. Conclusion

This project aimed at enhancing food waste management and awareness among college students. From the initial background research highlighting the critical state of Hong Kong's landfills to the comprehensive methodology involving bin collection, surveys, and educational tours of O · Park¹. The pilot and full schemes showed promising results in waste reduction, affirming the feasibility and effectiveness of such initiatives. Feedback from Wu Yee Sun College and SRSDO, along with student responses, have been constructive in shaping our future direction. The project addressed immediate environmental concerns and laid the foundation for ongoing commitment and possible expansion of these practices on our campus.

9. References

Food Waste Challenge. Environmental Protection Department. (n.d.).

https://www.epd.gov.hk/epd/english/environmentinhk/waste/prob_solutions/food_waste_challenge.html#Reduction%20at%20Source

What is a kilowatt-hour?. Constellation Residential and Small Business Blog. (2022, February 22).

<https://blog.constellation.com/2021/02/03/what-is-a-kilowatt-hour/>

O.Park. O • Park1. (n.d.). <https://www.opark.gov.hk/en/index.php>

10. Exhibit

A. Data Collected from the Pilot Scheme

Here are the full result and value estimation of the pilot scheme.

A1. Table and Bar Chart

Weight of Food Waste in E5/F and E7/F Pantries During Dinner Time (5 pm to 10 pm) from 5 October to 11 October 2023

Date	Weight of Collected Food Waste on E5/F (kg)	Weight of Collected Food Waste on E7/F (kg)
Thu 5 Oct 2023	0.3	0.2
Fri 6 Oct 2023	0.3	0.2
Sat 7 Oct 2023	0	0
Sun 8 Oct 2023	0.7	0.3
Mon 9 Oct 2023	0	0.3
Tue 10 Oct 2023	0.7	0.1
Wed 11 Oct 2023	0.4	0.6

Table 1. Weight of food waste during the pilot scheme

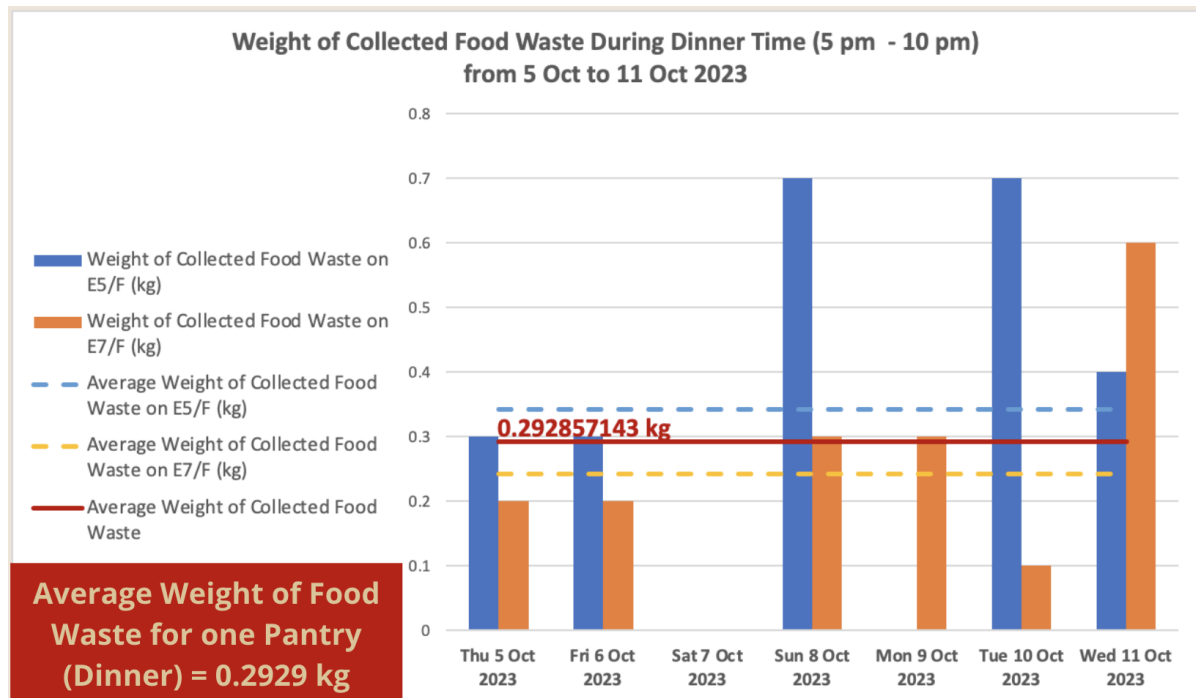


Figure 8. Bar chart illustrating weight of food waste during the pilot scheme

A2. Calculation of total amount of daily food waste generated from WYS pantries

Assumptions

- 1) The amount of food waste from both breakfast and lunch equals dinner.
- 2) There are seven floors and two pantries per floor. However, 2/F, 3/F, and 4/F have more rooms than other floors, so we will assume that these three floors have one more pantry. Thus, we will assume that there are $(7 * 2) + 3 = 17$ pantries in total.

Based on the above calculation, we have:

- Daily food waste amount per pantry = $0.2929 \text{ kg} * 2 = 0.5858 \text{ kg}$ (from Assumption 1)
- Hence, **the total food waste per day = 9.9586 kg ~ 10kg** (from Assumption 2)

A3. Value Estimation

Since 0.2 kWh electricity energy can be generated from 1 kg of food waste at O · Park1 (*Food Waste Challenge*, n.d.), we can approximate that the food waste generated from WYS pantries can be converted into $0.2 * 10 = 2 \text{ kWh per day}$. This amount of electricity can be used with a 50-watt laptop for $2000 \text{ Wh} / 50 \text{ W} = 40 \text{ hours}$ (*What is a kilowatt-hour?*, 2022). Therefore, our group expects this food waste separation scheme will be valuable if we can raise people's awareness and continue this campaign in the long run.

A4. Some Pictures of Food Waste Separation



Figure 9. The pictures of the bin setting in E5 and E7 floor during the pilot scheme.

A5. Food Waste Thrown at a Purple Bin



Figure 10. Food waste thrown at a purple bin

A6. Poster



FOOD WASTE COLLECTION

您好，我們是WYS的學生，致力完成我們的書院畢業項目。我們將回收WYS宿舍廚房的廚餘，你分離的食物垃圾將被收集並運送到北大嶼山的O-Park 1（有機資源回收中心第一期）發電。您的行動可以為我們的綠色環境和世界作出貢獻。感謝您的合作。
 Hello, we are a group of WYS students working on our college Final Year Project to manage food waste in WYS pantries. Your separated food waste will be collected and delivered to O-Park 1 (Organic Resources Recovery Centre Phase 1) in North Lantau for electricity generation. Your actions can contribute to our green environment and the world. Much appreciated for your cooperation.

RECYCLING STEPS



去除非可回收物質
Remove non-recyclable food waste



瀝乾水分
Drain liquid



扔入食物垃圾桶
Throw into a food waste bin

- 回收前必須去除食品包裝。Food packaging must be removed before recycling
- 小骨類（比牙籤短）或軟殼（蝦、蟹殼）可回收。Small bone (shorter than toothpick) or softshells (shrimp, crab shells) are recyclable
- 生、熟、吃剩或變壞食物也是「可回收廚餘」。Raw, cooked, leftover or spoiled food is recyclable food waste.

 <p>CAN</p>	<p>蔬果 Fruits & Vegetables 水果、蔬菜、豆類及其製品 (包括皮、核、種子) Fruits, vegetables, mushrooms, beans & their products (including peelings, cores, pits)</p>	 <p>CANT</p>	<p>惰性物料 Inert Materials 包裝紙、軟管、罐頭、餐具/餐盒、罐頭樽、茶包、紙巾、牙膏 Packaging, straws, cans, utensils/containers, glass bottles, teabags, tissue paper, toothpicks</p>
 <p>穀物 Wheat & Grains 米飯、粉類、麵粉、麵包、燕麥 Rice, pasta/noodles, flour, bread, oats</p>	<p>肉類 Meats 豬肉、牛肉、海產、家禽及其製品 (包括內臟、魚鱗、小骨頭) Pork, beef, seafood, poultry & their products (including innards, scales, small bones (shorter than toothpick))</p>	 <p>流質食物 Watery Food 湯、粥、飲品 Soup, porridge, drinks</p>	<p>硬質物料 Hard Materials 貝殼、蟹蓋、榴槤殼、粟米芯、椰青、芒果核 Seashells, crab covers, durian shells, corncobs, young coconuts, mango cores</p>
 <p>殘渣 Residues 茶葉渣、湯渣、咖啡渣、中藥渣 Tea leaves, soup pulp, coffee grounds, Chinese medicinal pulp</p>	<p>其他 Others 乳製品、甜品、堅果、寵物食品 Dairy products, desserts, nuts, sauces, pet food</p>	 <p>過大物料 Oversized Materials 豬筒骨、斧頭斬骨 Pork femur bones, tomahawk ribs</p>	<p>其他 Others 枝葉、雜草、切花、節日植物、藥物、口蓋 Branches, leaves/weeds, cut flowers, festive plants, medicines, surgical masks</p>

If you have any questions, please contact Joshua at 1155158979@link.cuhk.edu.hk

Figure 11. Poster for promoting food waste bin

B. Pictures of the O · Park1 Journey



Figure 12. O · Park1 visiting



Figure 13. O · Park1 overall landscape and the poster