

Waste & Recycling Composition Study

Rochester Community and Technical College
(RCTC)



**REDUCE.
REUSE.
RECYCLE.**



Rochester
COMMUNITY AND TECHNICAL
College
GET THERE.



**THERE'S A PROPER PLACE
FOR
ALL YOUR WASTE**



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Project Partners

This project would not have been possible without the partnership of Olmsted County, The Rochester Community and Technical College, and The Minnesota Pollution Control Agency

Special Thanks

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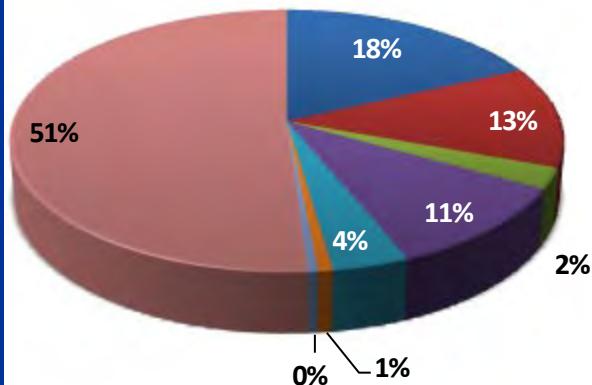
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Background: RCTC's Waste Management Structure

Olmsted County Environmental Resources Staff began working with the Rochester Community and Technical College (RCTC) to improve their recycling collection and work on reducing waste in the Spring of 2010. This work was made possible by an Environmental Assistance Grant from the Minnesota Pollution Control Agency to work with RCTC and other K-12 schools in Olmsted County to improve their recycling and waste reduction programs. In May, 2010, Olmsted County Staff completed a waste sort of trash taken from the Campus Center building at RCTC. Staff sorted nearly 350 pounds of trash. After the data was recorded and analyzed, Olmsted County Staff met with Cris Kellas (Building Services Supervisor) to present our findings and to recommend actions for improving the recycling and waste management program at RCTC. The analysis showed that RCTC's trash was composed of 49% recyclable material. Thirty-one percent (31%) of that recyclable material was recyclable paper and 11% was recyclable plastic bottles with necks.

RCTC Waste Composition by Weight. 2010 Study



	Material (lbs)	Material (%)
White/Pastel Paper	White Paper	61.5 18.0
Mixed paper	Mixed paper	43 12.6
Corrugated Cardboard	Cardboard	8.75 2.6
#1 & #2 bottles with necks	Tin	1.75 0.5
Aluminum Cans	Aluminum	13.31 3.9
Plastic	Plastic	36.25 10.6
Glass bottles	Glass	2.5 1.4
Tin Cans	Waste	174.25 51.1
True Garbage	TOTAL	341.31 100

Work began in early fall, 2010 to improve education surrounding proper waste management as well as improving RCTC's collection system, signage, and bin location. Olmsted County Staff completed a series of visits to the campus buildings to determine appropriate locations for paired waste and recycling bins and to make recommendations for better signage, recycling guides and student/staff education. RCTC and Olmsted County also prepared a contract for RCTC to participate in the county's revenue share program for white office paper. This gave RCTC an incentive to improve their collection system for paper on campus in order to see more income. RCTC uses the money gained on the revenue share program to purchase needed recycling bins and improve education on campus.

To improve paper collection on campus, Olmsted County Staff and Minnesota Pollution Control Agency Staff, worked together to create paper slot openings in each of RCTC's hallway bins and included a sticker labeled "paper too!". It became far more convenient for staff and students to recycle paper in the hallways. RCTC also began purchasing recycling bins for all classrooms, computer labs and lecture halls that were previously missing a bin. Olmsted County Staff prepared descriptive signs for each bin and recycling guides for students, staff and faculty. In addition, Olmsted County staff presented on faculty duty days and student success days to talk about the new program, encourage participation and answer questions about recycling and waste reduction.



RCTC's trash and recycling bins before the new program began and after the paper slots and new signs were created.

Olmsted County and RCTC staff planned a follow-up waste sort for the Spring of 2011 to evaluate how the new collection system and education on campus was affecting recycling and waste reduction behaviors. RCTC also began focusing on waste reduction efforts in the winter of 2011. They implemented a print-tracking program for students and staff that allows for 500 pages per student every semester. The school is also providing reusable "eco-clamshells" and reusable mugs and bottles in the cafeteria for purchase.



Summary: RCTC's 2011 Waste Sort

Introduction

How much waste and recycling is generated at the Rochester Community and Technical College (RCTC) daily? How much of the school's typical daily waste can be recycled or diverted? How did the changes RCTC made to their recycling system in the fall/winter of 2010 affect the overall composition of their waste and recycling on campus?

This report details findings from a waste and recycling sort of RCTC's Campus Center building conducted in April 2011. Olmsted County, in partnership with RCTC and the Minnesota Pollution Control Agency (MPCA), evaluated the waste and recycling generated at RCTC's Campus Center over a two day period (April 13th-14th). Campus Center is a building comprised of a cafeteria, library, several computer labs, art hall, faculty and administrative offices, laboratories, classrooms and lecture halls. This study was designed to acquire a snap-shot of RCTC's typical waste and recycling created over an average two-day period. It did not include any waste collected or managed at RCTC as construction and demolition, medical or hazardous. Restroom waste and waste from the childcare facility was intentionally left out of the collection and study.

Understanding the total generation and composition of RCTC's waste and recycling can help in identifying areas of improvement within their waste management system, such as reducing waste and improving or re-designing current collection programs. The 2011 waste and recycling sort also serves as a follow-up study of the waste sort completed in May 2010. Results of the sort will provide information on how RCTC's waste stream has changed over the course of the year as a result of changes made to the system in fall/winter 2010.

Methodology

All the waste from RCTC's Campus Center trash and recycling streams was collected for two days. The collected waste and recycling was then sorted into 11 material categories. This allowed for an analysis of the total generation, composition, and contamination of both the recycling and trash streams at RCTC.

Key Results

Waste Stream:

- Forty-four percent (44%) of RCTC's waste material could potentially be diverted from the trash to a food-to-hogs program and container/paper recycling collection programs.
- RCTC has decreased the amount of recyclable material found in the trash from nearly 49% in May 2010 to 23% in April 2011.
- Recyclable plastic contamination in the trash was reduced considerably from 29% by volume in 2010 to 13% by volume in 2011.
- The most prominent single material generated by RCTC was True Garbage, which was 34% of the total waste generated by weight.
- The second most prominent material generated at RCTC was food waste, which was 21% of the total waste generated by weight.
- The third most prominent material generated at RCTC was recyclable paper (Corrugated Cardboard, White Office Paper and Mixed Paper), which was 17% of the total waste material by weight.
- Ten percent (10%) of RCTC's waste stream is composed of non-recyclable plastic (#1-#6) and 12% of their waste stream is composed of non-recyclable paper. Twenty-two percent (22%) of the waste stream is a significant amount and provides opportunities for RCTC to adopt various waste prevention strategies to better manage this waste.
- Overall, 23% of RCTC's waste, by weight, could be diverted into the recycling stream.

Recycling Stream:

- The percentage of non-recyclable material found in the recycling was low. Only 4% non-recyclable material was found.
- Liquid waste is a significant portion of the recycling by weight, with 19% composition.
- The most prominent single material recycled by RCTC was White office paper, which was 42% of the total recycling generated by weight.
- The second most prominent material recycled by RCTC was Mixed paper, which was 13% of the total recycling generated by weight.
- The third most prominent material recycled by RCTC was plastic bottles, which was 11% of the total recycling generated by weight. (Most prominent material found when comparing recycling volumes as opposed to weight of recycling found)

Conclusion

While RCTC has significantly improved their program since the initial waste sort was completed in May 2010, there is still room for expanding their current recycling program to capture more recyclable material. Additionally, this study points to opportunities to reduce overall waste generation by adopting waste prevention strategies and expanding the use of reusable items. Making the effort to act on the potential for improved waste management practices at RCTC will help the school manage their budget during this tough economic climate, make their system more cost-effective and sustainable in the future, and in addition, conserve natural resources.



Study Methodology

Study's Purpose

The study's methodology was developed to:

1. Collect, sort and record the types and weights of all the trash and recyclable materials generated by the Rochester Community and Technical College over a two-day period (Wednesday, April 13th and Thursday, April 14th);
2. Separate out and weigh 11 material categories of recyclables, organics, and trash generated;
3. Record how much of each of those material categories was found in RCTC's commingled recycling and trash streams; and
4. Compare the results of the study to those of the study completed in May 2010 to determine the effectiveness of the program which was updated in the fall of 2010 and to develop measures for improving the existing program where needed.

The study was designed to yield a snapshot of RCTC's total waste generation and composition during a typical school day. All waste and recycling generated in RCTC's Campus Center building was collected on Wednesday, April 13th and Thursday, April 14th, 2011 and sorted on Monday, April 18th and Tuesday, April 19th 2011.

Waste Sampling Determination

The goal when determining the sorting procedure for the Spring 2011 sort at RCTC was to ensure a larger and more representative sample of material was collected and sorted than previously sorted during the Spring 2010 sort at RCTC. All waste and recycling on campus was collected on two separate week days to ensure the sample was representative of RCTC's average waste and recycling composition. Organizers of the sort selected two days during the week which were void of special events and were highly representative of a typical week-day at RCTC.

Material Sorting Categories

This study was concerned only with the materials that were routinely discarded as municipal solid waste (MSW) or collected for recycling at RCTC. Other waste streams, such as hazardous, medical, or construction and demolition waste were not collected or counted in this study. If any of these wastes were found in the trash or recycling streams while sorting, they were noted and typically recorded under the “true garbage” category for our purposes.

This study divided the collected material into 11 categories. These categories were selected to reflect the school’s current waste management system and to gather information that could be useful in implementing future diversion or reduction programs and expanding current practices at RCTC.

1) Nonrecyclable Paper

- Paper cups & plates
- Paper napkins
- Tissues & paper towels
- Pizza boxes
- Paper boats (e.g., French fry containers)
- Wax-covered cardboard

2) True Garbage

- Sporks
- Packets of disposable silverware
- Condiment packets
- Straws
- Unlabeled plastics or #7 plastics
- Chip bags, candy/granola bar wrappers (foil/plastic)
- Contaminated Styrofoam (bowls, clamshells, cups, trays)
- #1 -# 6 plastics of mixed components or product tainted (e.g., glue bottles, glue sticks)
- Juice boxes

3) Food waste

4) Nonrecyclable Plastics #1 - #6 (NOT #1 & #2 bottles with necks) (Non-Recyclable plastics in our program)

NOTE: Plastic grocery & produce bags, Plastic zipper bags, and Plastic liner bags from the trash/recycling sorted were collected in this category.

5) White office paper

- White & pastel copy paper
- Post-it notes™

6) Mixed paper

- Magazines, books & newspapers
- Construction paper
- Mail
- Manila envelopes & folders
- Shredded paper
- Paper ream wrappers (some; no waxy or gloss coated ream wrappers)
- Paperboard/boxboard
- Cereal boxes

7) OCC (Corrugated Cardboard)

- Uncoated corrugated shipping & storage boxes

8) Ferris Metal cans (Tin)

9) Aluminum Cans (Soda cans)

- no aluminum foil

10) Glass bottles

11) Plastic Bottles with Necks (#1 & #2)

- 1 Plastics: PET or PETE (Polyethylene Terephthalate)
- 2 Plastics: HDPE (High Density Polyethylene)

Field Methodology

The key for this study was to collect all of the waste and recycling on campus over a two day period, and to separate the bags of waste from the bags of recycling when brought to the loading dock for sorting.

The following collection and sorting procedure was used in this study:

- Before the start of the study, Olmsted County staff met with the building services supervisor and building services staff at RCTC to explain the collection method and establish the procedure for bringing the collected bags to the main sorting area and returning them to the appropriate compactor/dumpster when the sort was finished.
- Before the start of the study, Olmsted County staff members presented the waste sort procedure and additional information regarding waste sorts to the Environmental Biology class of 80-90 students that planned to sort the trash and recycling streams.
- The trash and recycling streams were sorted during four separate Environmental Biology laboratory periods. Two laboratory periods occurred on Monday, April 18th and two laboratory periods occurred on Tuesday, April 19th. A different group of students sorted the waste and recycling during each period.
- Four sorting stations (tables and 11 labeled sorting bins) were set up in the designated sorting area on the North Loading Dock of RCTC's Campus Center building.
- Tare weights of the bins used to capture the sorted waste were written on the side of each bin (Tare weight of each bin was consistently 5 lbs)
- Each sorting table had a team of 1-2 experienced staff members and 4-8 student sorters depending on the size of the lab.
- Student volunteers delivered full bins of the sorted material to the data entry table which was run by Olmsted County Staff members. After weighing the bins, the data was recorded in an Excel spreadsheet and entered again by hand. After weigh-in, student volunteers would empty the material into containers to be properly disposed of after the sort.

The sorting was completed by experienced Olmsted County and Minnesota Pollution Control Agency Staff members as well as student volunteers from RCTC's Environmental Biology Class. Olmsted County and Minnesota Pollution Control Agency Staff assisted the student volunteers with questions related to the material categories and proper disposal.

In total, 618 lbs of material from the waste stream was collected and sorted. Additionally, 200.5 lbs of material from the recycling stream was collected and sorted.

Limitations of Methodology

While the material collected and sorted was an accurate sample of RCTC's waste and recycling streams, some factors inherent in the methodology and the way the material categories were set up may have altered the data obtained. These factors include:

- The sampling and sorting events, while collected over a two day period and sorted over another two day period, were a sample that only represents a very small snapshot of the annual picture. (special events, holidays, beginning and end of the school year and other miscellaneous events that traditionally create more waste were not factored into this study)
- Only the materials that were collected by RCTC's Building Services staff were sorted. While all of the waste and recycling generated on campus over the two day period was meant to be collected, it is not 100% certain if all of the material collected was brought to the north loading dock instead of the trash compactor and recycling dumpster.
- Olmsted County staff made a decision to place the plastic liner bags that held the trash and recycling in the non-recyclable plastic #1-#6 category. While non-recyclable plastics (#1-#6) comprised 10% of the waste stream by weight, it is expected that the decision to add the liner bags to this category as opposed to a "true waste" category, may have altered the data slightly.
- Olmsted County Staff also made a decision to combine food waste and liquid waste in one material category. While food waste/liquids comprised 21.4% of the waste stream by weight, it may be misleading. It was noted by experienced staff that the majority of the "food waste/liquids" collected was truly liquid waste from un-emptied beverage containers and not true, food waste which would be more readily taken by a hog farmer.
- Inconsistency in understanding which materials belonged in which categories may have had an impact on data. While the student volunteers were trained and guidance was provided, complete sorting accuracy cannot be realized. For example, some tables may have treated food-soiled Styrofoam plates as "non-recyclable #1-#6 plastic", while another table may have treated it as "true waste".

Even with the limitations mentioned above, it is believed that the data obtained from this study is an accurate representation of RCTC's recycling and waste streams. This data will be helpful for targeting future educational campaigns, waste reduction projects and expanding recycling programs in the future.



Study Results

Waste Composition

Table 1 reflects the composition of waste and recycling by weight at the Rochester Community and Technical College (RCTC). The most prominent material found in the waste stream at RCTC was true garbage with nearly 34% of the total waste stream. Food waste/liquids was the second most prominent category represented, accounting for 21% of the total waste stream by weight. Recyclable paper, which includes paper sorted into three categories, white office paper, mixed paper and corrugated cardboard, accounted for nearly 17% of the waste stream by weight.

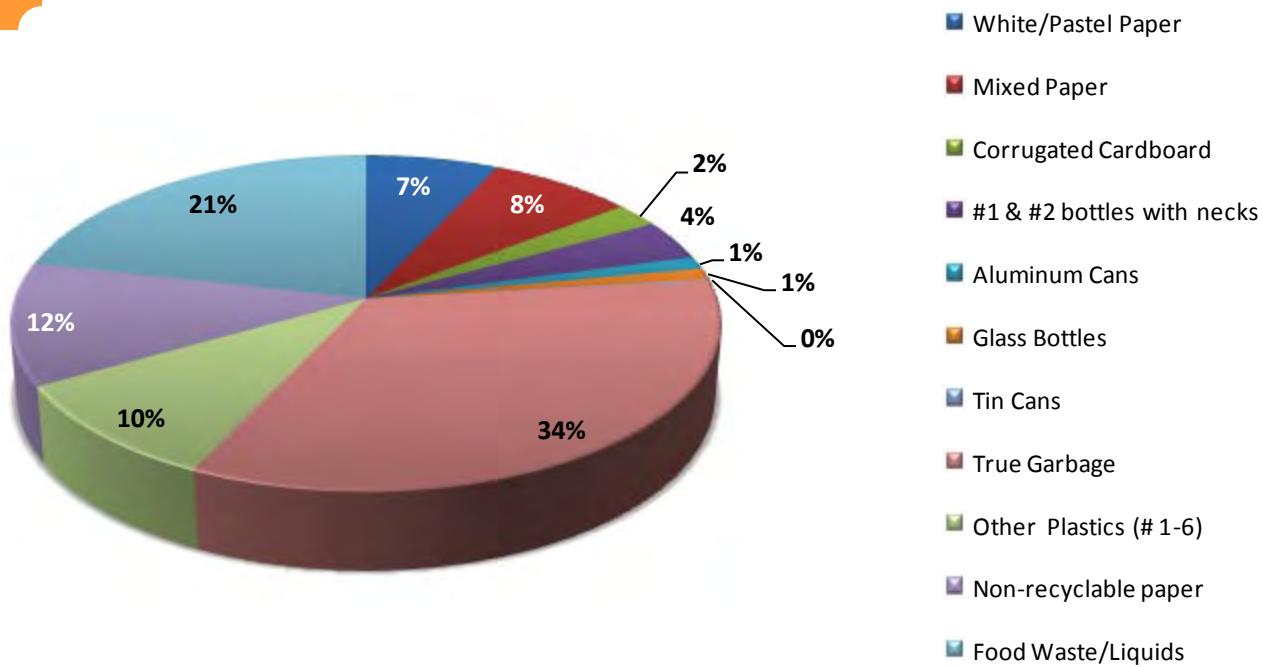
Table 1 Composition of Materials in RCTC's Trash and Recycling by Weight, 2011 Data.

Material	2-day Total (lbs)	Trash (lbs)	Trash (%)	Recycling (lbs)	Recycling (%)
White/Pastel Paper	126.5	43	7.3	83.5	41.6
Mixed Paper	74	47	7.6	27	13.5
Corrugated Cardboard	22	14.5	2.3	7.5	3.7
#1 & #2 bottles with necks	46	24	3.9	22	11
Aluminum Cans	16.5	7.5	1.2	9	4.5
Glass Bottles	11.5	6.5	1	5	2.5
Tin Cans	2	1	0.2	1	0.5
True Garbage	208.75	208.75	33.8	0	0
Other Plastics (# 1-6)	67	60	9.7	7	3.5
Non-recyclable paper	73.25	73.25	11.8	0.5	0.3
Food Waste/Liquids	170.5	132.5	21.4	38	19
TOTAL	818.5	618	100	200.5	100

RCTC is currently bringing their white office paper to the county recycling facility on a revenue share program. The school would benefit greatly from capturing the white paper that is currently being thrown away (7% composition of waste by weight).

As shown in Figure 1, non-recyclable paper and non-recyclable plastics were also prominent materials found in the waste stream with 12% and 10% of the waste stream by weight respectively. There are many opportunities for decreasing the purchasing of these materials on campus and implementing a program for making more sustainable purchasing decisions in the future to reduce the volumes of these materials. Recommendations for reducing waste on RCTC's campus will be discussed in detail later in this report.

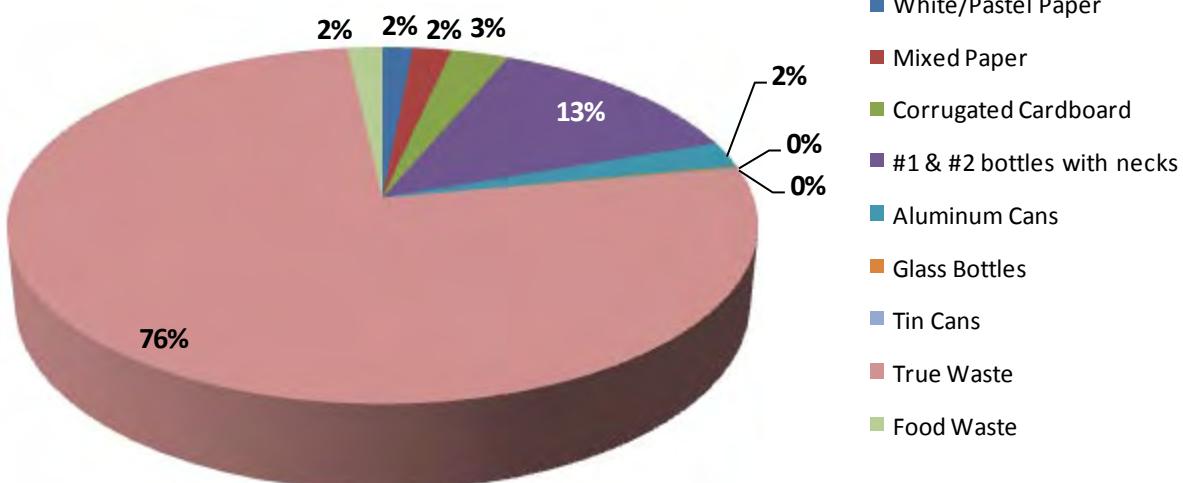
Figure 1 RCTC's Campus Center Waste Composition by Weight. 2011.



NOTE: Volume conversion rates were taken from the Environmental Protection Agency's (EPA) Recyclemania Program Resources.

Figure 2 depicts the percent composition by volume of all materials collected in the trash stream at Campus Center. It is important to also compare volumes because while a material may be light in weight, it may be taking up a large space in the compactor or dumpster. While a waste hauler may charge by the weight of the material picked up, it also charges based on the size of the compactor and the frequency of pick-up.

While true waste is taking up the majority of space in the compactor with 76% of the waste stream by volume, plastic bottles (#1-#2 bottles with necks) are taking up 13% of the compactor by volume. Plastic bottles were only 4% of the waste stream by weight, but 13% by volume. If the bottles were disposed of properly in the recycling bin, RCTC may be able to save money on their hauling bill by reducing the size of their trash compactor. In total, 24% of the trash compactor by volume is recyclable material.

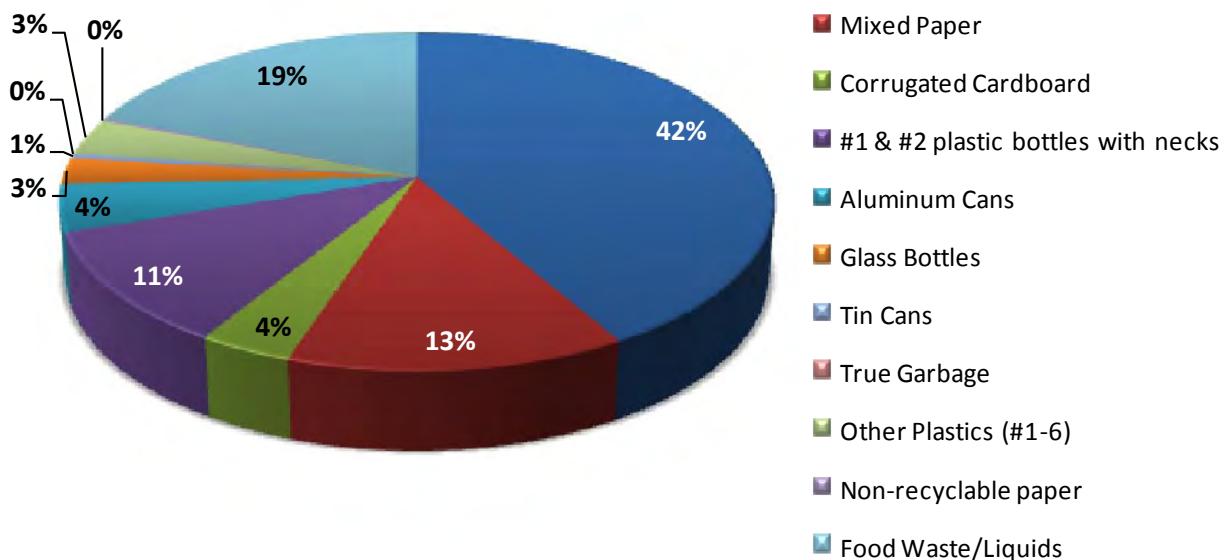
Figure**2****RCTC's Campus Center Waste Composition by Volume. 2011**

NOTE: Non-recyclable paper, non-recyclable plastics and true garbage were combined into one category: "True Waste" in this pie chart.

Recycling Composition

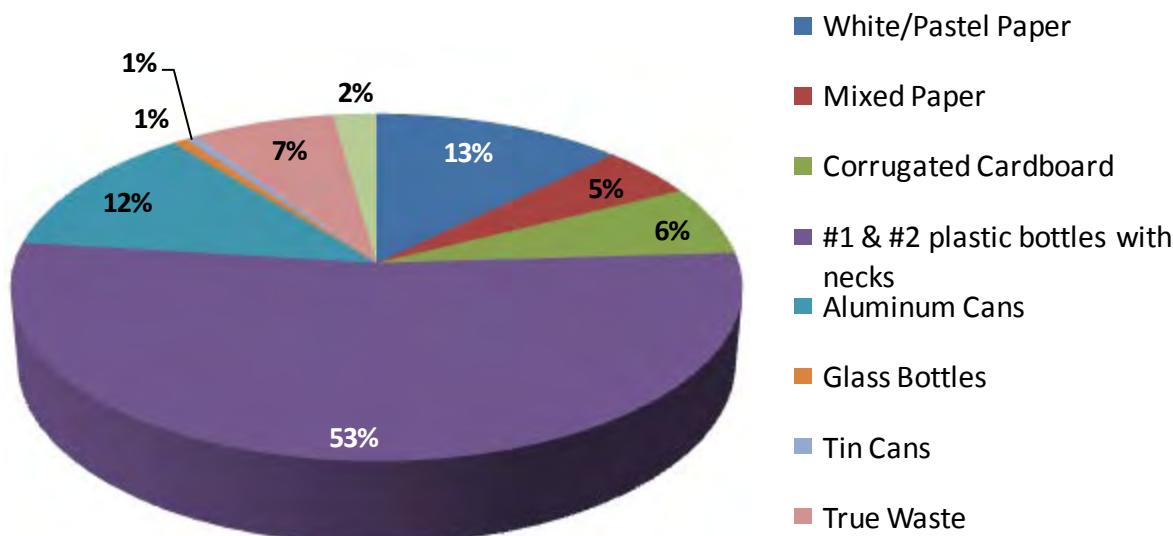
Table 1 reflects the composition of waste and recycling by weight at the Rochester Community and Technical College (RCTC). The most prominent material found in the recycling stream at RCTC was white/pastel paper with nearly 42% of the total recycling stream by weight. Mixed paper was the second most prominent category represented, accounting for 13% of the total recycling stream by weight. Plastic bottles made up 11% of the recycling stream by weight and was the third most prominent material represented.

Recyclable paper represented 59% of all recyclable material collected (Fig. 3). There may be further opportunity for RCTC to collect all recyclable paper products in a separate stream to be taken to the Olmsted County Recycling Center on the revenue share program. RCTC could potentially see significant financial gains in the future from selling more material.

Figure RCTC's Campus Center Recycling Composition by Weight. 2011**3**

Figure**4**

RCTC's Campus Center Recycling Composition by Volume.



NOTE: Non-recyclable paper, non-recyclable plastics and true garbage were combined into one category: "True Waste" in this pie chart.

Figure 4 depicts the percent composition by volume of all materials collected in the recycling stream at Campus Center. It is important to compare volumes of materials in addition to the weight of materials because it may alter the size of the recycling dumpsters RCTC has on campus. RCTC's current waste hauler charges by the volume of the dumpster that is picked up, but it also charges based on the frequency of picking-up the dumpster. RCTC has already increased the size of their recycling dumpster on campus center from an 8 cubic yard dumpster to a 10 cubic yard dumpster since their new program was implemented.

RCTC is collecting a large volume of containers. Over 50% of the total volume collected is plastic bottles and 12% is aluminum cans on RCTC's Campus Center (Fig. 4). As the college begins increasing recycling participation, especially container collection, they may save money by increasing the size of their recycling dumpsters and requesting less frequent pick-ups by their hauling company (See Appendix A)

Figure 4 also shows us that a large volume of all recycling collected on campus is white office paper. As RCTC increases recycling collection and adds more recycling bins in the library and classrooms, they will have a significant increase in the amount of white paper collected for the revenue share

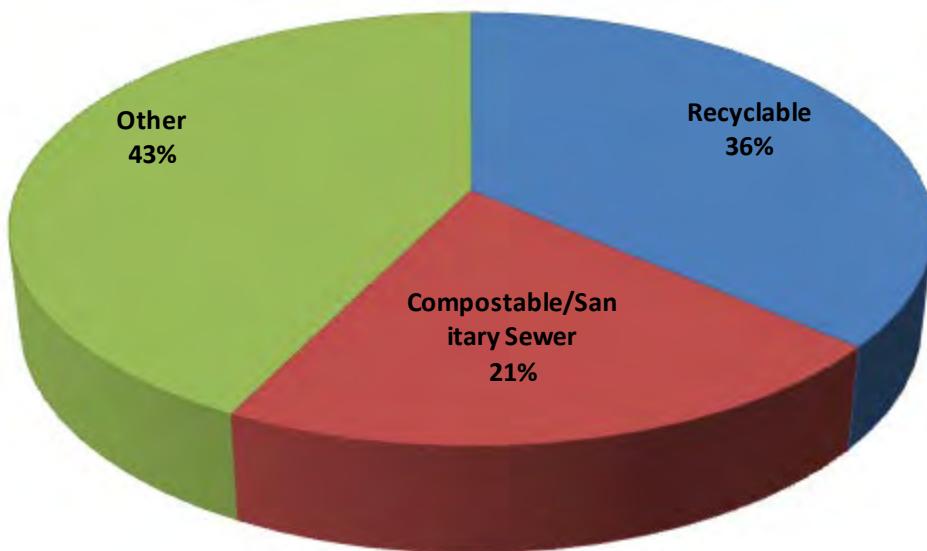
Recyclable and Compostable Components of RCTC's Waste

The waste sort at RCTC examined all discarded waste including material that was separated for recycling. Combining the data found from sorting both the trash and the recycling streams gives us an overall picture of how much total material could be recycled or potentially composted in the future.

Figure 5 depicts the breakdown of RCTC's total waste and recycling composition. It shows what percentage of RCTC's total waste is recyclable, compostable, and which components are neither recyclable nor compostable under RCTC's current program. The analysis shows that 57% of RCTC's total waste could be managed through recycling or compost programs or by utilizing the sanitary sewer for disposing of liquid waste.

Figure**5**

RCTC's Recyclable and Compostable Components of all Waste



The materials considered recyclable for this analysis included materials that are collected at RCTC. These include:

- White/Pastel office paper
- Mixed Paper
- Corrugated Cardboard
- #1 & #2 plastic bottles with necks
- Aluminum Cans
- Glass Bottles
- Tin/Steel Cans

Materials included in the compostable category in Figure 5 includes materials that could either be sent to a food-to-hogs program or disposed of through the sanitary sewer (food waste or liquid waste). Olmsted County does not operate an industrial compost facility and could not dispose of non-recyclable paper through a food-to-hogs program.

Materials included in the “other” category in Figure 5 include:

- Non-recyclable paper
- Non-recyclable plastics (#1-#6, not #1-#2 bottles with necks)
- True Garbage
- Hazardous Waste

Thirty-six percent (36%) of RCTC's total waste can be recycled through their current system. Twenty-one percent (21%) of RCTC's waste is “compostable waste”. RCTC could also save money by properly disposing of the liquid waste down the sanitary sewer. In this study, liquid waste and food waste were combined in one category. It was noted that the majority of the food waste was liquid waste from un-emptied beverage containers. To gain better knowledge of the percent of food waste that could be sent to a food-to-hogs program, liquid waste and food waste would need to be separated in a future study.

Waste Per Capita at RCTC

Table 2 outlines how much total waste was generated at RCTC over the two days of the study. The waste generated includes all trash, recyclables and potential compostable material that were discarded in both the waste and recycling streams. Student and staff populations are also listed to demonstrate how much waste is typically generated on a per capita basis in the campus center building. RCTC's waste hauler, Veolia Environmental Services, is required to bring RCTC's trash compactors to Olmsted County's Waste to Energy Facility. Olmsted County receives a report of RCTC's monthly Municipal Solid Waste tonnage that is collected in the Campus Center buildings. For comparison, Olmsted County's data was used to calculate average per capita waste generation over the span of a month. The weight per capita from the recent waste sort is comparable to the weight per capita calculated from Olmsted County's recorded monthly tonnage from the Campus Center compactor. This suggests that data from the 2-day study are reliable.

Table
2

Daily Waste Generated at RCTC

*Waste Generated 1-day Avg (lb)	**Number of Students (April)	**Number of Staff (April)	Total Population	***Daily per capita waste (lb) study	****Daily per capita waste (lb) Veolia Records
409.25	7534	633	8167	0.05	0.06

* Total average waste based on average of the two study days

** Data provided by the Rochester Community and Technical College

*** Daily per capita waste generated from the study data

****Data provided by Olmsted County's MSW reports for average daily waste generated April 2010

Figure
6

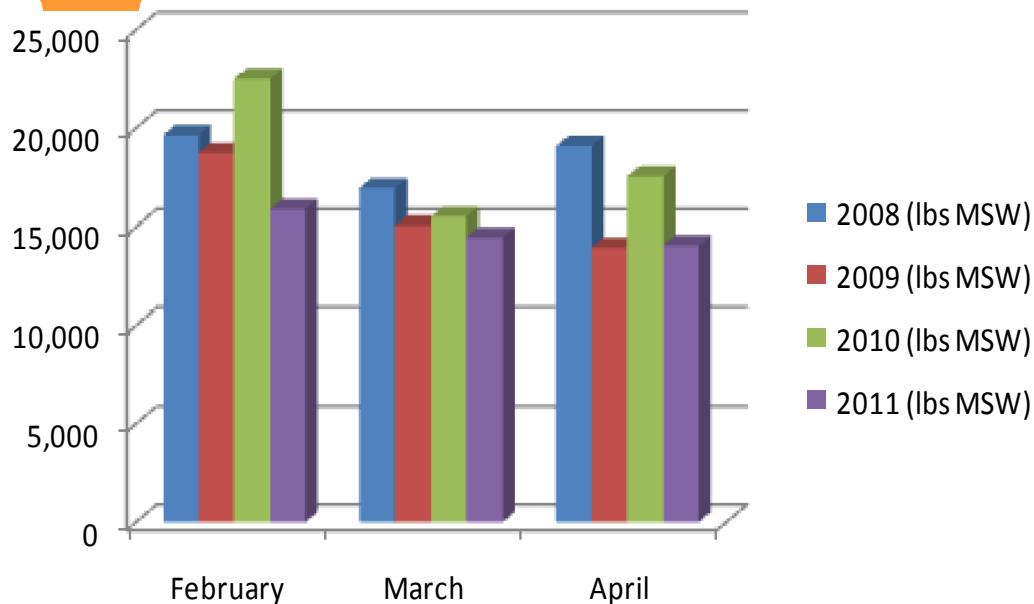


Figure 6 represents changes in RCTC's waste generation over the past 4 years.

Waste generation as a whole has decreased since data started being collected in 2008. There has also been a decrease in the amount of waste generated over the past year.

The decrease could be due, in part, from increased recycling rates and waste reduction strategies implemented at RCTC.

Recommendations for Waste Reduction

The Rochester Community and Technical College (RCTC) has already made many strides to reduce the amount of waste generated on campus. RCTC has implemented a print tracking program which allows each student 500 sheets of paper per semester. They also set all defaults on printers in the library and computer labs to duplex printing, which will significantly reduce the 479,500 sheets of paper that RCTC is currently using monthly. Additionally, RCTC has made many changes to promote waste reduction in their cafeteria. They offer reusable mugs and bottles for purchase and they also give away reusable bottles for students at their annual “Student Success Day”. RCTC also recently stocked their cafeteria with “eco-clamshells” for purchase. This is an alternative, reusable “to-go container” option to the Styrofoam plates and non-recyclable paper boats that are currently offered in the cafeteria. Cafeteria staff offers to wash the eco-clamshells between uses as an extra incentive for purchasing reusable service-ware.

While RCTC is making improvements to their waste reduction plans, there are still many efforts they could explore to reduce the amount of waste generated, reduce costs, and benefit the environment. Combined, the state of Minnesota’s “Solid Waste Management Tax” and Olmsted County’s “Environmental Service Charge” create an incentive for reducing the amount of trash generated and increasing recycling rates. RCTC could implement more simple strategies such as expanding the use of reusable items, providing more resources online to avoid printing paper copies, working on a pilot-compost program and exchanging their current non-recyclable materials in the cafeteria and concession areas with reusable or recyclable materials.

Paper Reduction

Paper materials (cardboard, office paper and mixed paper) accounted for 17% of the waste stream by weight. Reducing the amount of excess pamphlets and brochures printed at RCTC would be a great target— extra copies of old publications made up a large percentage of the mixed paper found in the trash. Offering more publications and resources online as opposed to printing them would help RCTC decrease their paper usage.

Reuse- Trays, Utensil & Service-Ware

Offering a greater incentive and an educational campaign surrounding RCTC’s reusable items like the eco-clamshell and reusable bottles would help RCTC cut down on the amount of non-recyclable paper, non-recyclable plastic, and Styrofoam service-ware purchased in the cafeteria. Also, RCTC currently has a dish-washing system in working order. RCTC could re-evaluate the use of the washer and purchasing reusable trays and utensils to replace the disposable variety.

Reuse- Food

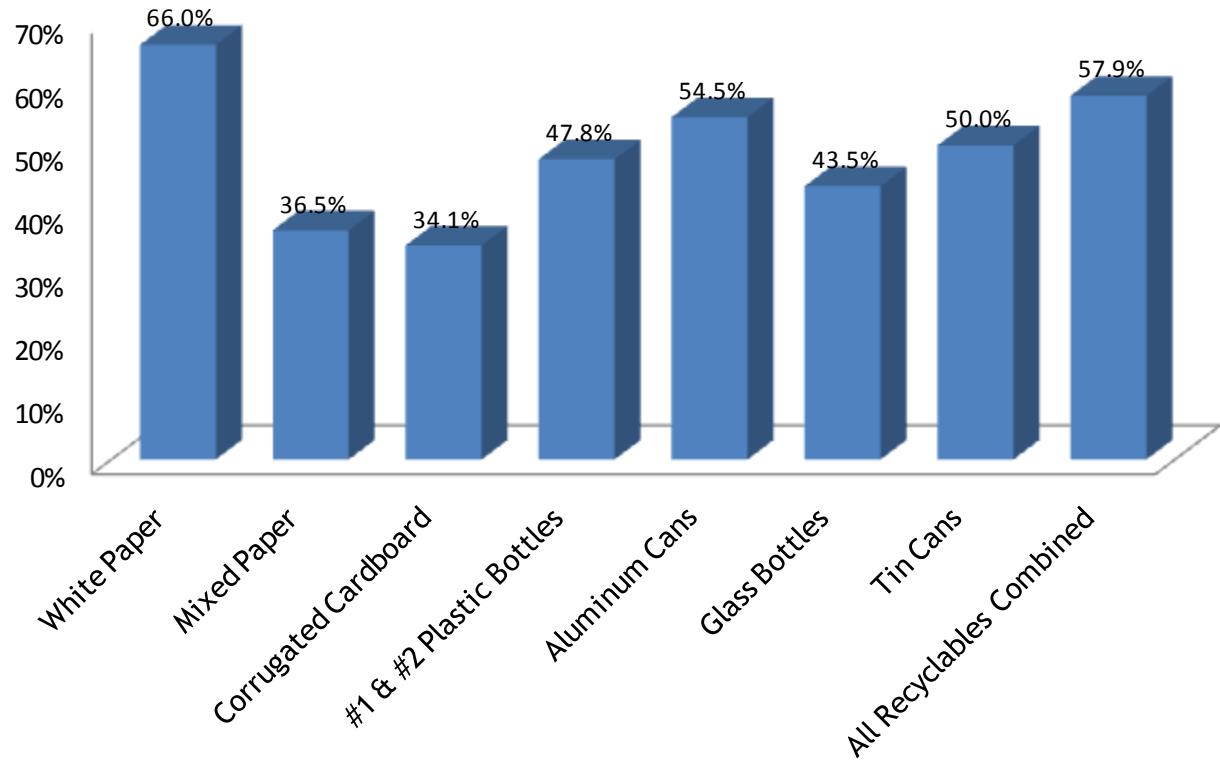
RCTC might consider working with a local hog farmer to utilize extra food waste generated in the cafeteria. With 22% liquid/food waste by weight in the trash stream, RCTC could significantly decrease the amount they pay their hauler if food and liquid waste was taken out of the trash stream and diverted to a food-to-hogs program. Using composting as an educational aspect in the school’s horticulture program would also be beneficial. Students and professors could set-up a collection system for produce scraps, old produce, and coffee grounds used in the cafeteria and snack shops. Compost created through this effort could be used on campus grounds.

Capture Rates

Capture Rates vs. Recycling Rates

A recycling rate indicates the percentage of a school's waste that has been placed in recycling containers. For example, RCTC generated 818.5 lbs of waste, of which 200.5 lbs was placed in a recycling container. This would be a nearly twenty-five percent (24.50 %) recycling rate. A capture rate defines how much of a recyclable material is captured by a recycling program. For example, RCTC generated 126.5 lbs of white office paper, of which 83.5 lbs were placed in the recycling bin. That indicates a 66% capture rate for White Office Paper.

Figure 7 Capture Rates for Recyclable Material at RCTC's Campus Center



The graph in Figure 7 depicts the capture rate for each recyclable material at RCTC's Campus Center. This capture rate analysis shows there is an opportunity to capture even more material for recycling.

While the capture rate for White Office Paper is strongest with a 66% capture rate, the majority of other recyclable materials are being thrown away in larger quantities than they are recycled. However, since RCTC's capture rates were not previously evaluated in 2010, this analysis represents a starting point for working toward capturing more recyclable material. This can be done by expanding current recycling programs, continuing to upgrade the existing system, and increasing student and staff education.

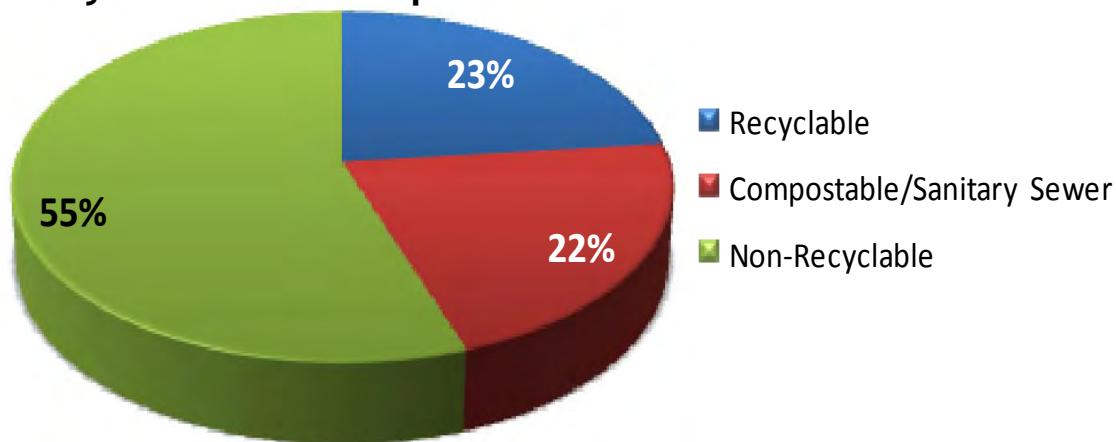
Additionally, capture rates are expected to rise significantly as RCTC continues to add recycling bins in the classrooms, lecture halls and laboratories.

Contamination in Recycling and Waste Streams

Figure 8 shows that the material currently discarded is comprised of recyclable and compostable/sanitary sewer material that could be captured for recycling, composted, or disposed of properly through the sanitary sewer. Twenty-three percent (23%) of the trash could be recycled and 22% could be composted or properly disposed of through the sanitary sewer. Forty-five percent (45%) of what is disposed at RCTC could be handled in a more environmentally friendly manner. There is also potential for RCTC to save money through significant improvements in composting and recycling as recyclable and compostable material are not subject to the Solid Waste Management Tax through the state of Minnesota.

Figure 8

Recyclable and Compostable Materials in Trash

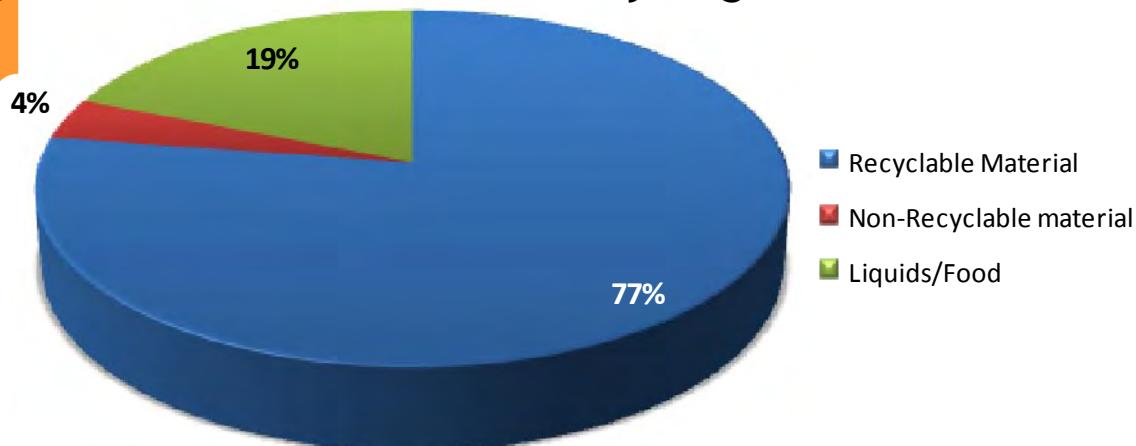


Recycling Stream Contaminants

During the Spring Waste Sort of 2011, the recycling stream was sorted to determine how clean the co-mingled recycling stream is at RCTC. Figure 9 depicts the percentage of contamination in the recycling stream.

Figure 9

Contamination in RCTC's Recycling. 2011



The highest contamination came from liquid waste, which accounted for 19% of the total contamination found in the recycling. RCTC could potentially develop a way to encourage the emptying of leftover liquids prior to disposal. The second most prominent contaminant was non-recyclable plastics (#1-#6 containers) which accounted for almost 4% of the contamination. RCTC should continue educational campaigns and dispersing information about the types of materials that can and cannot be recycled on campus.



Conclusions

Considerable components of the Rochester Community and Technical College's (RCTC) waste stream could be reduced, recycled, potentially composted or properly managed through the sanitary sewer. There is still opportunity to expand and improve the school's recycling program and to begin thinking of ways to reduce and divert waste in other areas. RCTC has significantly reduced the amount of recyclable material found in its waste stream, from 49% recyclable material in the trash in 2010 to only 23% composition of recyclable material during the study in 2011.

While the existing program has improved, RCTC is only capturing about 58% of all recyclable material in the recycling stream and 42% is still being thrown in the trash. Another significant portion of the trash is compostable material or liquid material that could be more properly managed through the sanitary sewer (22% by weight). That's virtually 45% of the trash stream that could be diverted through the existing recycling program and sanitary sewer.

Combined, RCTC could save a significant amount of money by focusing on reducing waste and increasing the capture rates of recyclable materials. As RCTC begins thinking about changing its hauling contract, they should look for recycling markets that were not previously available and other areas to revenue-share with Olmsted county or their hauling company. In addition, considering a Resource Management Contract to place the economic value of the contract on the service/weight rather than the volume would be a beneficial way to track waste and recycling tonnage. It would also help RCTC better manage their program and any necessary changes to the system in the future (See Appendix A for more information).

It will also be beneficial to continue promoting educational events surrounding waste reduction and recycling as their student body turns over and as they continue to make changes to their current waste management system.

Appendix A

Table
1

Current and Projected Budget/Savings for Trash and Recycling Hauling Services

Current Budget	Monthly Cost	Annual Cost	Annual Weight (lbs)	Annual Volume (yd ³)	Annual Cost/lb	Annual Cost/yd ³
Recycling Surcharge (22 yds)	\$38.94	\$467.28				
Recycling Service (22 yds)	\$193.70	\$2,324.40				
Recycling Total Campus	\$232.64	\$2,791.68	36,591	263	\$0.08	\$10.61
Dump and retreat fee (Avg \$135/pickup)	\$600.00	\$7,200.00				
Fee per ton (Avg \$86/ton)	\$2,296.78	\$27,561.36				
Trash Total Campus	\$2,896.78	\$34,761.36	352,260	1,174	\$0.10	\$29.61
Fuel/environmental fee charges	\$404.69	\$4,856.28				
Non-taxable fuel/enviro. fee	\$26.38	\$316.56				
Fuel Total	\$431.07	\$5,172.84				
Solid Waste Management Tax (17%)	\$561.25	\$6,735.00				
Olm. Cty Enviro. Service Charge (17%)	\$605.28	\$7,263.36				
Tax Total	\$1,166.53	\$13,998.36				
Total	\$4,727.02	\$56,724.24	388,851	1,437		
Projected Future Budget	Monthly Cost	Annual Cost	Annual Weight (lbs)	Annual Volume (yd ³)	Annual Cost/lb	Annual Cost/yd ³
Recycling Surcharge (22 yds)	\$62.76	\$753.12				
Recycling Service (22 yds)	\$312.80	\$3,753.60				
Recycling Total Campus	\$375.56	\$4,506.72	62,780	452	\$0.07	\$9.98
Dump and retreat fee (Avg \$135/pickup)	\$533.50	\$6,402.00				
Fee per ton (Avg \$86/ton)	\$1,468.01	\$17,616.12				
Trash Total Campus	\$2,001.51	\$24,018.12	326,071	1,087	\$0.07	\$22.10
Fuel/environmental fee charges	\$404.69	\$4,856.28				
Non-taxable fuel/enviro. Fee	\$26.38	\$316.56				
Fuel Total	\$431.07	\$5,172.84				
Solid Waste Management Tax (17%)	\$409.05	\$4,908.65				
Olm. Cty Enviro. Service Charge (17%)	\$477.38	\$5,728.61				
Tax Total	\$886.44	\$10,637.25				
Total	\$3,694.58	\$44,334.93	388,851	1,539		

The Rochester Community and Technical College currently spends about \$57,000 on trash and recycling hauling fees annually at the Campus Center, Heinz Center and Sports Center. Their current hauler, Veolia Environmental Services, charges by the volume of recycling picked up and by the weight of trash picked up. RCTC pays, on average, \$135 each time a trash compactor is picked up. However, the Campus Center and Sports Center Compactors are often picked up twice monthly even though the compactor is not full. The Heinz Center compactor is sometimes only picked up once every two months, but RCTC pays a high fee for having a 4yd dumpster picked up every month. RCTC could significantly reduce their hauling fee by requesting that the compactors are only picked up when full, and all other trash receptacles on campus are re-evaluated for their proper size (volume) and necessity.

Additionally, RCTC pays a different fee per ton, \$86-92, depending on where the trash is picked up on campus. RCTC could save a significant amount of money on their hauling fee by standardizing the fee charged per ton of material thrown away.

Finally, if RCTC worked toward diverting the 23% recyclable material that is found in the trash to the recycling stream, they could realize a significant reduction in hauling costs. It costs far less to recycle material than to throw it away. On top of saving on the dump and retreat fee and hauling fee for picking up less material, RCTC also is taxed less because the state of Minnesota's Solid Waste Management Tax only applies to municipal solid waste (MSW) and not recyclable material.

In Table 1, the "Current Budget" contains the current weight of trash collected (352,260 lbs in 2010) and the estimated weight of commingled recyclable material collected (36,591 lbs). The "Projected Future Budget" illustrates how RCTC could benefit by diverting the 23% of recyclable material that is currently being thrown away to the recycling stream (Figure 8). In turn, the recycling stream increased by 23% to show how recycling costs would be altered to accommodate a larger volume. The projected budget also reflects changes in hauling fees after RCTC and their hauling company re-evaluates all dumpsters and compactors on campus for their proper size. While the recycling fees increased by a small amount, the trash fees were reduced by a significant amount. Making the proper adjustments to RCTC's current waste management plan with Veolia Environmental Services and making the effort to increase recycling capture rates, could potentially save RCTC nearly \$12,500 in recycling and trash hauling fees annually.

RCTC would also benefit from working with their hauler on a resource management contract. This contract would place the economic value on the service and weight rather than the volume and would provide RCTC with more accurate information. They could also discuss revenue sharing with their hauler or Olmsted County for recyclable materials collected on campus. Table 2 provides current market value information based on Olmsted County's Revenue Share Program.

**Table
2**

Commodity	Market Price per Ton 5 year Average	SEMREX Olmsted County Revenue Share \$/ton
White Paper	\$163.75	\$61.96
Mixed paper	\$82.43	\$23.74
Cardboard	\$95.88	\$30.07
Plastic bottles (PET)	\$0.12	NA
Aluminum Cans	\$0.53	NA
Tin Cans	\$155.00	\$57.85
Glass Bottles	NA	NA

This table reflects Olmsted County's end market prices for recyclable commodities. RCTC's hauler may have different end markets and may receive a higher or lower price for their recyclable commodities. This table simply demonstrates what RCTC could gain from selling its recyclable materials as opposed to paying for them to be picked up.

Appendix B

RCTC's Recycling/Trash Signage and Recycling Guide

ROCHESTER COMMUNITY AND TECHNICAL COLLEGE

Recycling



**Colored Paper, Newspaper,
Magazines, Tin Cans,
Aluminum Cans,
Glass Bottles, Plastic Bottles
with Necks (#1)**



Rochester
COMMUNITY AND TECHNICAL
COLLEGE

1851 30th Avenue SE | Rochester, MN 55904
1.800.247.1296 | TTY Relay # 1.800.627.3529 | www.rctc.edu

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**REDUCE.
REUSE.
RECYCLE.**

ROCHESTER COMMUNITY AND TECHNICAL COLLEGE

White Paper Recycling



**REDUCE.
REUSE.
RECYCLE.**

**White Office Paper (with staples)
White Envelopes
Notebook Paper, Index Cards**



Rochester
COMMUNITY AND TECHNICAL
COLLEGE
GET THERE

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ROCHESTER COMMUNITY AND TECHNICAL COLLEGE

Trash



**REDUCE.
REUSE.
RECYCLE.**



**Plastic Ware, Food Waste,
Styrofoam, Pizza Boxes,
Yogurt Cups, Plastic Bags**



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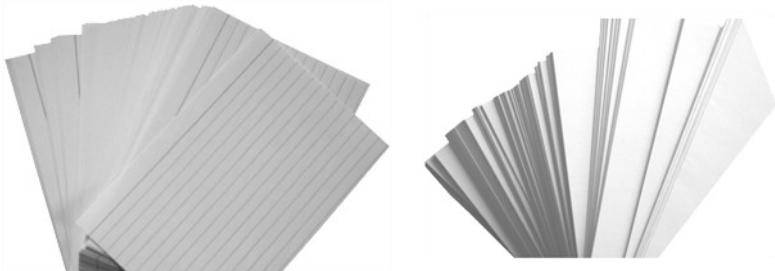
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Recycling Guide

WHITE OFFICE PAPER RECYCLING

Recycled in blue bins labeled "white office paper"

White Copier Paper	Shredded Paper
Post-it notes	Adding Machine
Envelopes	Carbonless forms
Legal Pad Paper	Letterhead
Stationary	Brochures & Pamphlets (non-glossy)
Time-sheets	Bond
Paper with staples	Index cards



COMINGLED RECYCLABLES

Mixed Paper, Tin/Steel Cans, Aluminum Cans, Plastic & Glass Bottles & Cardboard

Mixed Paper

Boxboard (cereal, cracker, copier boxes etc)	Brown paper bags
Magazines	Craft envelopes
Catalogs	Card Stock Paper
Neon or dark colored paper	Cards (no glitter or foil)
Newspapers	Construction Paper
File Folders	Pamphlets and Brochures (glossy)



Tin/Steel Cans

Empty liquids before recycling!



Aluminum Cans

Empty liquids before recycling!



Plastic and Glass Bottles

#1 & #2 bottles with necks only.
Empty liquids before recycling!



Cardboard

Ask where cardboard is collected within department



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