University of Illinois Urbana-Champaign Campus Building Waste Characterization & Opportunity Assessment

Executive Summary

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Prepared For:
University of Illinois Facilities & Services (F&S) Waste Management Department

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Project Background

In fall 2023 the Illinois Sustainable Technology Center (ISTC) conducted a waste audit to identify and measure the types of landfill (trash) and recycling material generated on the University of Illinois Urbana-Champaign (U. of I.) campus. Better understanding of these material streams can inform education and infrastructure improvements that can reduce contamination, increase recycling diversion rates, and reduce total waste production, per the goals of the most recent Illinois Climate Action Plan (2020).

ISTC hand-sorted landfill-bound (trash) and recycling waste stream samples into pre-determined material categories and weighed them to calculate the percentage of each. ISTC also spoke to stakeholders, conducted walkthroughs of each audited building, and surveyed building occupants on behavior and opinions about campus waste management.

ISTC audited 8 buildings in four "Activity Zones." Separating results by activity zone allows for more specific insights in different types of spaces and more targeted recommendations.

Academic	Academic + Lab	Multi-Activity	Student Living
• Business Instructional Facility (BIF) • Campus Instructional Facility (CIF)	• Roger Adams Laboratory (RAL) • Noyes Laboratory	• Illini Union • Activities and Recreation Center (ARC)	• Lincoln Avenue Residence Halls (LAR) • Allen Residence Hall

ISTC conducted a similar waste audit with the U. of I. in 2014 and 2015, then an assessment of indoor waste infrastructure (trash and recycling bin availability) in 2019. Discussions about the 2023 audit began in fall 2021 between ISTC and the U. of I's Facilities & Services (F&S) to see how waste habits had changed since the last audits. In September 2022, the U. of I. hired its first full-time Zero Waste Coordinator, Daphne Hulse, who applied for funding from the Student Sustainability Committee to supplement available F&S funding to audit eight buildings. The grant was awarded in late spring 2023, and plans were made to conduct the audit in fall 2023.

Objectives

F&S was interested in exploring the following objectives through the current waste audit:

1. Assess current campus waste management practices, waste streams, and process flows in four different "activity zones."
2. In buildings included in the 2015 study (Allen/LAR, Business Instructional Facility, Roger Adams Laboratory, and the Illini Union), see how waste habits have changed over time. Consider the lasting impacts of the COVID-19 pandemic on waste management, including supply chain disruptions and hygiene-related behavior changes.
3. Gauge awareness of waste management programs and practices among members of the campus community, especially those who regularly spend time in the study buildings.
4. Determine, if possible, if 3-bin stations improve the quality and quantity of recycled materials.[1]

[1] This goal was not addressed in the course of this audit, and further research is needed.

Current Conditions

In FY23 (July 1. 2022 to June 20, 2023), campus landfilled 5,824.21 tons of waste. This is greater than the iCAP target of 4,554 tons for FY24, indicating a need for continued improvement in waste reduction and capture of recyclable materials.

Indoor Bin Infrastructure and 3-Bin Containers

At the end of 2019, ISTC began working with F&S to implement several recommendations from the 2019 indoor waste infrastructure assessment, including a new standard collection container. F&S chose bins from MaxR that are colorful, clearly marked, and made of 97% recycled plastic. New buildings will include this style of bin as part of facility standards, and replacements are ongoing. As of March 2024, 245 MaxR bins have been deployed in 70 campus buildings.

ISTC found during building walkthroughs that bin types and signage still varied widely in the audited buildings, as did external collection infrastructure (dumpsters, totes, etc). F&S messaging has changed over the years, with an effort for greater clarity in bin labels and signage, but older signage persists on older bins. For example, a vague label of "Bottles and cans" with no further detail might be misinterpreted to include tin cans and glass bottles, which are not accepted in the university's recycling program.

Many labels may also have been produced independently by building occupants, who might mistakenly publish misinformation; for example, Champaign and Urbana municipal recycling programs accept glass, tin cans, and plastics ♻3-7, but the U. of I. does not.

The university is working to ensure that trash and recycling containers are consistently present, visible, well-labeled and convenient in all spaces. Buildings and departments can now request a 3-bin station on the F&S recycling homepage.

What is Recycled on Campus and How?

The 3,000+ recycling bins in campus buildings collect mixed paper, plastic bottles with ♻1 and ♻2 resin codes, and aluminum cans (ex. soda cans).[2] Recycling and trash bins are emptied by building service workers (BSWs) to external docks for pickup.[3] Buildings' external collection infrastructure varies based on space constraints and volume of waste produced. Recycling may be stored in material-specific totes or dumpsters. In instances of extreme space limitation, blue-bagged recyclables or flattened cardboard may be placed in the landfill-bound dumpster for transport to the Waste Transfer Station, where they will be removed and sorted.

A tote like the ones used to store paper, plastic, and aluminum on external docks for F&S pickup.

[2] F&S also collects lamps, scrap metal, and other bulky materials for recycling and disposal. This audit described but did not quantify those waste streams, nor other on-campus specialty recycling programs.
[3] Cardboard is not accepted in public campus recycling bins due to its bulk but is collected by buildings.

All trash and recycling pickup from outside buildings is conducted by F&S Waste Management employees, who take the materials to the Waste Transfer Station (WTS), also managed by F&S Waste Management. There, materials are sorted by bag color, then opened and sorted by material. The plastic, paper, and aluminum are then baled and sold as commodities to recycling facilities across the US. Trash, including contamination from the sorting line, is compacted and sent to Clinton Landfill #3 in Clinton, IL. The Waste Transfer Station conducts regular, free tours of the facility for faculty, staff, and students to see how it all works, or watch on YouTube.

The Bag Standard and the Waste Transfer Station

The Big Myth: "All trash bags get the recyclables sorted out of them." Since all trucks and bags go to the same Waste Transfer Station, people may think that all bags are given a second sort, regardless of origin or bag color. **This is not, and has never been, the case!** The WTS is not automated with sophisticated sorting technology, as some larger materials recovery facilities are, although plans are in progress to experiment with computer vision. All sorting is currently done by hand by a hardworking team rarely numbering more than 4-8, often including workers through Champaign County's Developmental Services Center.

The volume of incoming materials is high, so workers often identify recyclables by shape, such as looking for plastic beverage bottles or milk jugs on the conveyor belt to retrieve plastics with resin codes ♻1 or ♻2. This is why campus recycling guidelines specify "bottles and cans."

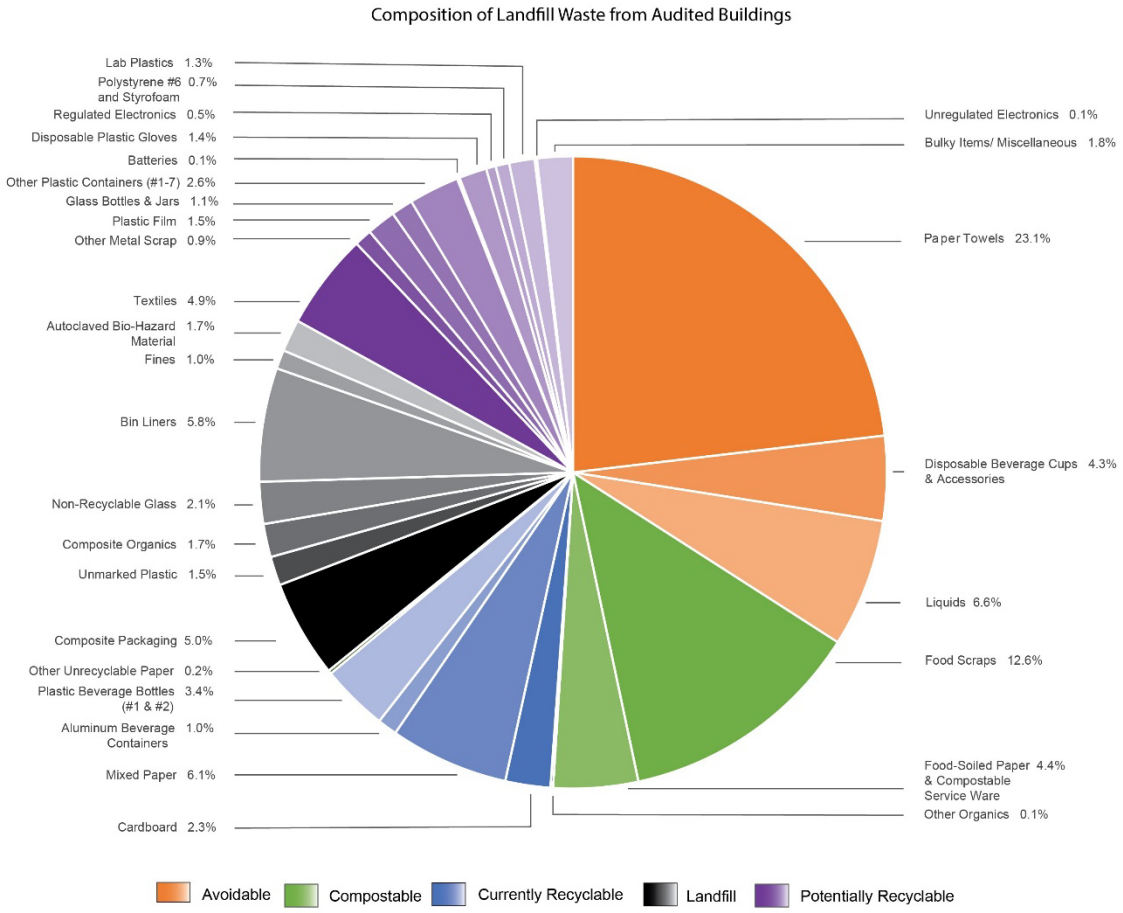
In 2019, F&S created a bag color standard: black bags for lab and bathroom trash, blue bags for recycling, and clear bags for other trash.[4] This allows staff to prioritize bags containing valuable, clean recyclables instead of dirty, wet trash. **Black bags are never sorted, or even opened, at the WTS.** They go directly to the compactor. **Blue bags are opened and sorted, as are clear bags that visibly contain recyclables.** Recyclable items in clear bags may be hidden or dirtied by the contents of the rest of the bag, and not be sorted. **The most guaranteed way to dispose of clean, dry, acceptable recyclables is in a recycling bin with a blue bag.**

Figure 39. Illustration of F&S bag color standard.

[4] ISTC found inconsistent bag colors during building walkthroughs, indicating uneven awareness of this standard. F&S is working to improve awareness and compliance with this standard across campus so that the system can work like it's supposed to.

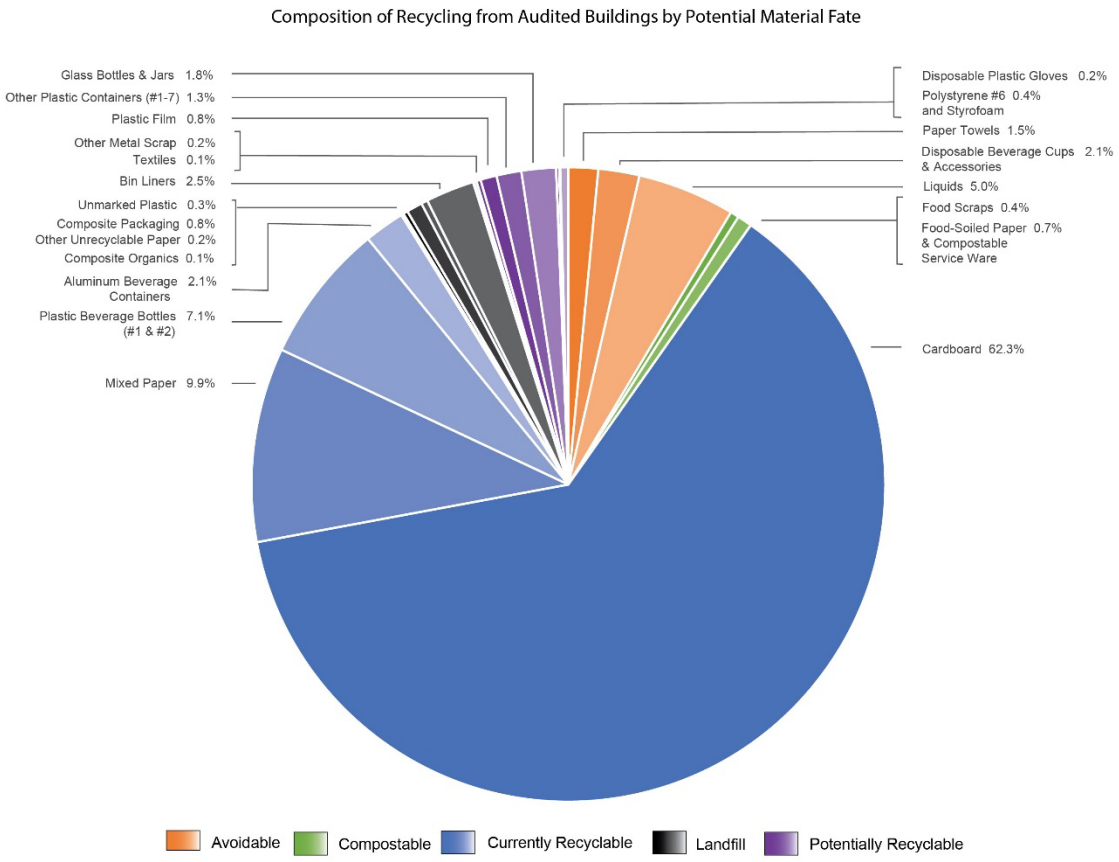
Audit Findings

Summary of Landfill Waste



Within all 1742.3 pounds of landfill-found trash sorted across activity zones in this audit, only 18.9% had no other fate than being sent to the landfill (gray). 34% was considered avoidable. Nearly 23.1% of all landfill waste was paper towels, which could be composted, recycled through a special program, or replaced by electric hand dryers instead of being trashed. Currently recyclable materials represented 12.9% of the waste stream, or 224.76 pounds of material. Another 17.1% might be recycled with expanded recycling programs. Finally, 17.1% was compostable.

Summary of Recycling Stream



Within all 1065.7 pounds of material from recycling streams across activity zones sorted in this audit, 81.4% was correctly recycled; 62.3% of all material sorted was cardboard. 18.6% is not currently accepted and is considered contamination. Liquids were the largest (by weight) material category contributing to contamination at 5.0% of all material sorted. Liquid contamination can ruin even correctly recycled items; paper and cardboard must be clean and dry to be eligible for baling and sale as commodities.

Recommendations

ISTC made 39 total recommendations in the following 7 categories. Some recommendations fell under multiple categories; see the full report for the complete list and details. Accountability for the consideration and implementation of these recommendations will be shared among various campus units and departments, depending on the focus of the recommendation. Responsible parties are indicated in the recommendation table included in the full report and include F&S; auxilliary units; University Purchasing; facility managers for specific buildings; Central Stores & Receiving; the Institute for Sustainability, Energy, and Environment (iSEE); the Division of Research Safety; Campus Recreation; the Illini Union (including Document Services); University Housing (including Dining Services); various University maker spaces/3D print labs; the Division of Intercollegiate Athletics (DIA); and the University library system.

Education and Outreach (16) – These recommendations encourage education of the campus community on standards, guidelines, and best practices of waste management, as well as outreach and engagement to assess areas of need. Topics include publicity for ongoing but low-visibility programs, the bag color standard, accepted items for recycling, and proper disposal of items not accepted in campus bins.

Infrastructure (7) – These recommendations address infrastructure improvements. This includes consistency and accuracy of bins and their signage, as well as changes. Structural changes can foster behavioral changes that reduce waste and process waste streams more efficiently.

Programming (13) – These recommendations suggest the creation of new programs or the support of ongoing ones. Topics include engagement and expansion on existing infrastructure improvements, special collection recycling programs, and systems of reuse.

Purchasing (8) – These recommendations seek to address campus waste at the source: its purchase. Alternative products or materials may be easier to reuse or recycle than existing ones designed for single-use and disposal.

Policy (4) – These recommendations codify and standardize sustainable changes across campus.

Retail (2) – These recommendations address changes specifically in restaurants, coffeeshops, and other retail areas.

Research (7) – These recommendations suggest areas of further research related to current and future recycling streams, education, programs, and infrastructure improvements.