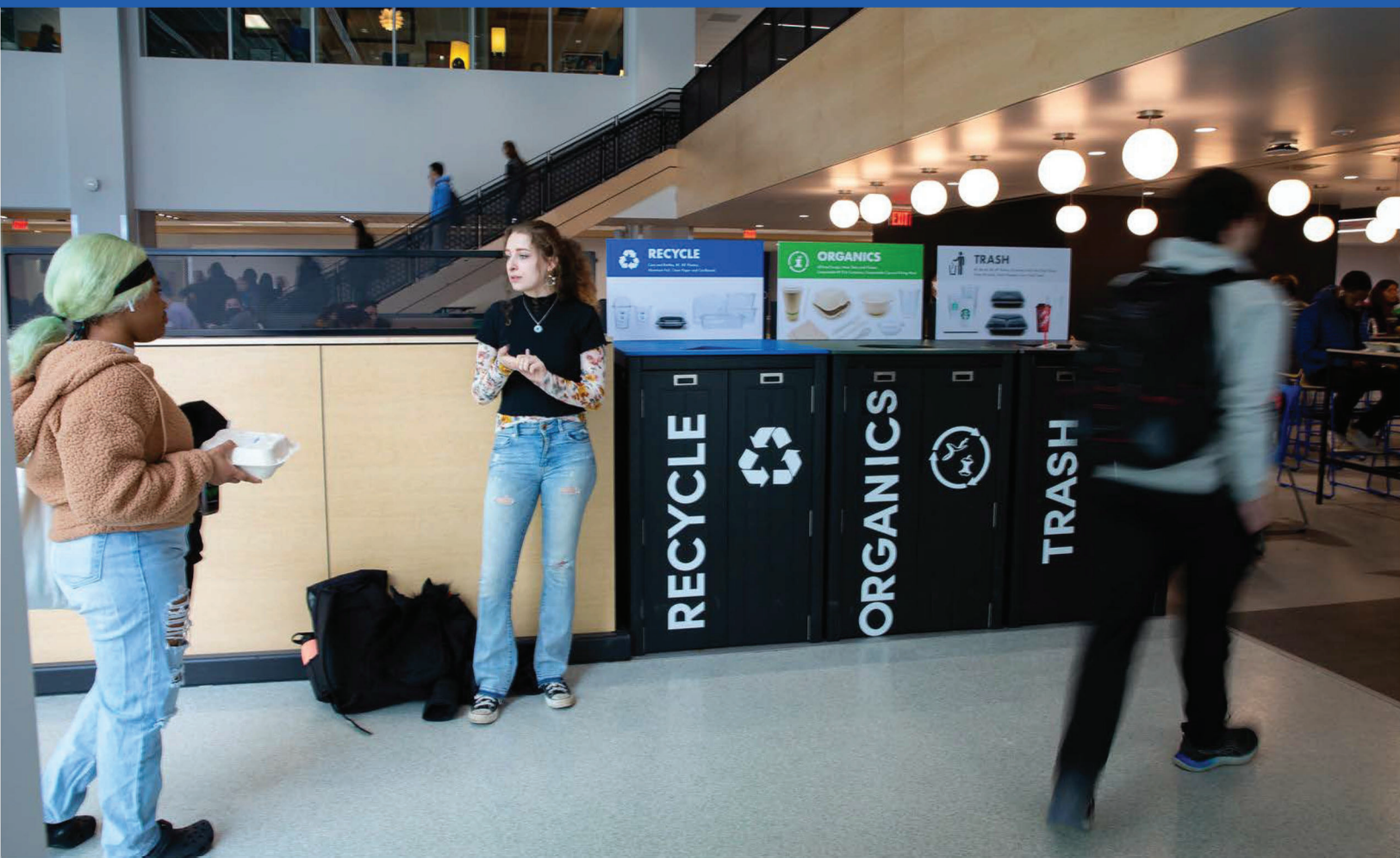


# ZERO WASTE:

A CLIMATE ACTION STRATEGY





# CHAPTER 1: EXECUTIVE SUMMARY AND INTRODUCTION

## IMPETUS FOR ACTION

The University at Buffalo (UB) understands the existential threat that climate change poses to its institution, its region, state, country, and planet. That is why they have doubled down on their commitment to become climate neutral. To achieve this, UB is standing on the shoulders of five decades of environmental leadership and focusing its climate action work on a holistic solutions-oriented approach.

UB's [10 in 10](#) is its roadmap of ten innovative, engaging, and digestible steps that it is advancing to increase climate action throughout the University and continue the path to net zero emissions by 2030. The strategy is holistic, inclusive, engages the broader community, and leverages a triple bottom line approach and the United Nations' Sustainable Development Goals (SDGs).

Over the past several years, UB has reduced its carbon footprint by about a third and has strategically focused on replacing its annual electricity load to 100 percent renewable energy sources. As a whole, UB's ten strategic areas and three integrative themes, climate justice, resiliency, and leveraging the academy, will help move UB toward its 2030 climate neutrality goal.

In January 2020, UB began the process of identifying high impact areas to guide the University on its journey to zero waste by 2030. Areas of focus included the following:

- Re-think campus purchases and practices.
- Identify and measure the scope of waste.
- Create campus standards for zero waste.
- Redistribute usable goods on and off campus.
- Improve zero waste education.
- Divert all organics from waste.
- Eliminate prepared food waste.
- Eliminate single-use plastic.
- Develop a business and funding plan.

Additionally, state agencies are now directed by the State of New York to adopt a sustainability and decarbonization program, with waste reduction as one of the key components of that [directive](#). As the flagship university within the State University of New York (SUNY) system, UB has worked directly with SUNY and the New York State (NYS) Department of Environmental Conservation to inform these policies and identify timelines that are both responsive and reasonable. Executive Order No. 22, *Leading by Example: Directing State Agencies to Adopt a Sustainability and*

*Decarbonization Program*, requires state entities to create and file waste diversion plans with the following key elements:

- Schedule for conducting routine waste audits of facilities and utilizing that data to further waste reduction.
- Plan for diverting organic waste from landfills.
- Plan to eliminate single-use plastics in all circumstances where doing so will not endanger employee or public health or safety.

This report, *Zero Waste: A Climate Action Strategy*, focuses on progressing the University's Climate Action Plan by addressing one of the 10 in 10's key strategies: diverting 90 percent of waste generated as a result of campus operations. As a strategy, achieving zero waste helps UB move closer to carbon neutrality. However, the impacts of waste on equity and historically disadvantaged communities must be considered (i.e., how does zero waste engage with UB's teaching and

research across the academy, and how does zero waste ensure stability, adaptability, and longevity of UB's campus?).

The goal of this report is to guide this work and provide a current baseline to measure progress against. There has been a lack of reliable data surrounding waste generated on campus, which impacts the University's ability to effectively plan, implement, and communicate progress and opportunities. The research conducted for this report involved identifying materials that the campus currently generates, understanding ways in which those materials are disposed, discussing opportunities for the greater campus community to engage and participate in reduction of waste, and, most importantly, identifying opportunities to reduce greenhouse gas (GHG) impacts associated with disposal. This report is an important component of UB's portfolio of work guiding zero waste efforts and the findings in this report will be used to inform strategies and actions to help UB achieve success.

# UB's 10 in 10





UB recognizes that most of the climate and sustainability impacts generated from the University community stem from the supply chain of purchased products and energy. These purchases made by and for our community have a huge environmental, equity, and economic footprint. The University can use its purchasing power to have vendors identify and disclose equity issues in the supply chain to better understand opportunities to benefit the local community.

Equity and climate justice should be an explicit part of all University, community and organizational planning around zero waste. There are known and inferred impacts associated with every purchase and investment: upstream impacts that occur during product creation, impacts from the useful life of the product, and downstream impacts at end of life. University policies

and contracts can specify third-party certifications and disclosures that help make equity issues more transparent. These upstream and downstream impacts include the Scope 3 emissions associated with the goods and services purchased by the organization.

## DEVELOPING A BASELINE AND FORMULATING AN APPROACH

UB contracted with RRS, a consulting firm focused on circular economy and zero waste solutions, to build on the work completed internally. RRS was tasked with two main goals: to provide a more detailed view of UB's baseline waste management practices and performances and to synthesize that information to create a strategic plan with detailed recommendations and next steps that will help UB reach 90 percent waste

reduction by 2030. During this process, UB has been performing independent research on the benefits of performance based solid waste, organics, and recycling contracts to leverage the expertise and on-the-ground knowledge that waste management companies can provide institutions committed to achieving zero waste. The University has also secured the funding necessary for a campuswide expansion and improvement of collection infrastructure, which will ensure that all individuals on campus will have the ability to engage in diversion practices through the new recycling, organics, trash (R/O/T) stations.

RRS began working with UB in April 2023 to put a plan together for a campus site assessment, which was designed to enhance the understanding of UB's solid waste management system and to identify the strengths and weaknesses of the current system. RRS and UB

identified 11 buildings on UB's three campuses representing different functions on campus, including administrative offices, academic areas, residential dormitories, dining facilities, receiving dock locations, and medical labs. RRS then developed a set of criteria for the walk-through, which included observing any visual signs of recycling contamination, obvious recyclable items found in the trash, what types of bins and containers were used, whether trash and recycling were paired and convenient for use, and the general process for collecting and transporting waste to dumpsters and compactors. RRS was also able to identify key staff members to provide additional qualitative information about their role in the waste management system. Themes and key findings from the site assessment are listed in Table 1 and were used to help develop the strategic objectives included in the implementation plan of this report.

*Figure 1: Aggregated bagged waste from a UB building being transferred to the waste audit.*



Table 1: Key findings of the UB campus site assessment.

KEY AREA	KEY FINDINGS
Collection	<ul style="list-style-type: none"> <li>• Most of the trash and recycling containers were nearly empty during the walk-through, showing adequate capacity for collection and potential overservicing.<sup>1</sup></li> <li>• Yard and gardening waste (leaves, brush, etc.) isn't being collected for diversion and was found in the trash.</li> <li>• Organics collection (both front of house and back of house) is working well in One World Café and should be expanded to all dining areas on campus.</li> </ul>
Infrastructure	<ul style="list-style-type: none"> <li>• Space is a large limiting factor to expanding back-of-house recycling infrastructure (compactors, aggregation points, etc.).</li> <li>• Buildings do not have set locations for trash and recycling containers, and this can cause issues as they get moved often.</li> <li>• Many trash and recycling containers were not paired side by side, which can be inconvenient for people trying to make the proper disposal choice.</li> <li>• NY is a bottle deposit state so students can return bottles and cans for a five-cent deposit, which drives diversion through incentivization. Deposit material is largely collected by a limited number of reverse vending machines administered by Campus Dining and Shops. Feedback from staff was that the reverse vending machines are often full and that there are not enough of them.</li> </ul>
Education and Outreach	<ul style="list-style-type: none"> <li>• Most areas that had recycling containers lacked signage indicating what was recyclable, how to recycle, and even which bin was intended for recycling, making it incredibly challenging for the campus community to participate. Signage and education, when present, was not clear and consistent.</li> <li>• UB uses a colored bin liner system for trash, recycling, and compost. However, the colored bags lining the containers are not consistent, both within the University and with “universally recognized” colors. Blue was often used for trash and green for recycling; typically, the waste management standard is that blue is used for recycling, green for compost, and clear or black for trash.</li> </ul>
Supporting Policies and Practices	<ul style="list-style-type: none"> <li>• There is an opportunity to include requirements to provide adequate space to support material diversion programs in renovated or newly constructed buildings.</li> <li>• UB currently has a recycling policy and a recycled paper policy, but neither policy has been updated recently and is not enforced.</li> </ul>
Materials Collected	<ul style="list-style-type: none"> <li>• Through interviews, staff mentioned low capture rates for recyclables (specifically cans, bottles, and paper packaging) in certain areas, like the dorms. This can be partially attributed to a lack of education and inadequate collection infrastructure.</li> <li>• UB does not have successful collection programs for certain hard-to-recycle (not collected in the single-stream recycling system) material, such as the following:             <ul style="list-style-type: none"> <li>○ Polystyrene packaging (specifically at the UB Medical Building)</li> <li>○ Wood, metal, and cement from the Architecture Studios</li> <li>○ Plastic film</li> </ul> </li> </ul>

<sup>1</sup> The walk-through and site assessment took place in June during the summer semester, so the lower use of the solid waste infrastructure on campus could be attributed to this time of year.



Figure 2: Waste being sorted at the UB waste audit.

To better understand UB’s trash and recycling stream, RRS conducted an audit of trash and recycling generated in six different types of buildings at UB. In September 2023,<sup>2</sup> three RRS staff members joined UB’s Zero Waste Manager and UB students to sort through 1,517 pounds of trash and recycling.

Results from the waste audit showed that organics were not only a large part of the trash stream, but they also were found in the recycling stream where they are considered a contaminant (Figure 3). Overall contamination was at 33 percent. This consisted of organics and liquids, compostable food containers, paper cups, non- bottle PET plastic, PP plastic, flexible film, other plastics, HHW/electronics/C&D, and other residue. Recyclable mixed paper was found in higher quantities in the various trash streams, showing an opportunity to increase the collection of that

### CAMPUS-WIDE MATERIAL BREAKDOWN

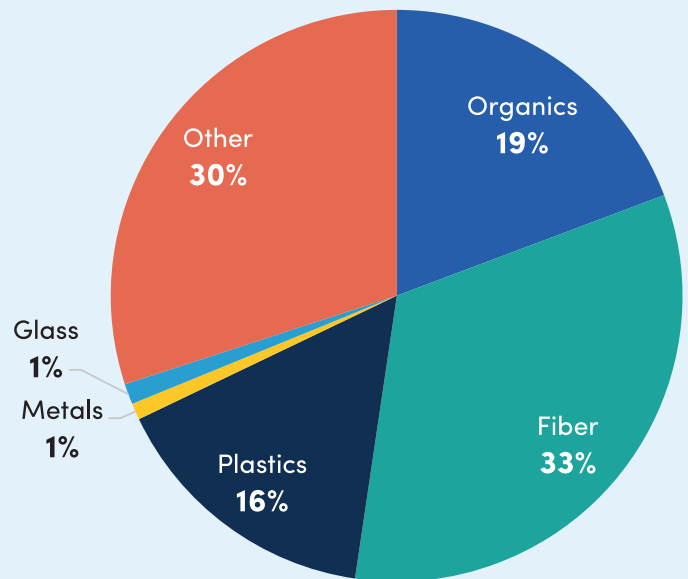


Figure 3: Results of the campuswide waste audit by material type.

<sup>2</sup> RRS and UB elected to wait until the fall semester was underway to have a more accurate representation of materials that were generated on UB’s campuses.

# ACTION AREAS



Figure 4: Action areas and recommendations

material for recycling. Based on the results of the waste audit, the project team identified the action areas with recommendations in Figure 4.

Additionally, RRS researched other universities to compare UB's programs with those implemented at other large universities. This report contains a detailed comparison of zero waste and waste management related programs and initiatives in practice at Boston University, the University of Texas at Austin, and the University of Washington. It also provides three case studies that were developed in conjunction with UB based on initiatives that UB wanted to learn about in more detail.

## SYSTEM ASSESSMENT, GAP ANALYSIS, AND RECOMMENDATIONS FOR WASTE DIVERSION

Following the baseline assessment of UB's waste generation, composition, infrastructure, and programs, RRS completed an analysis of potential gaps in the system. These gaps are indicative of opportunities for additional programs, optimization of existing system aspects, and the potential for novel actions and investments to help UB achieve zero waste. Using the strengths and opportunities identified in the gap analysis, RRS developed the following strategic priorities for moving forward with waste reduction initiatives at UB. Each priority is previewed in Table 2 and described in detail in Chapters 6 and 8.



Table 2: Identified strategic priorities.

STRATEGIC PRIORITIES
<p><b>Develop Strong Management and Metrics Across All Zero Waste Initiatives.</b>                      Ensure efficient and effective management, coordination, and governance of all zero waste initiatives across the university enterprise by defining clear roles and responsibilities including leveraging external professional services, while also ensuring strong metrics and measurement for operations, reporting, and success.  <i>Unknown impact / difficult to determine<sup>3</sup></i></p>
<p><b>Create Standardized and Unified Zero Waste Infrastructure for UB.</b>                      Ensure collection equipment across campus is easily identifiable and consistent; reduces confusion and barriers to participation; includes clear, engaging and informative signage and labeling; is serviceable; and works within the existing built environment.  <i>65 tons diverted or reduced   174 MTCO<sub>2</sub>E prevented</i></p>
<p><b>Acquire and Deploy New Zero Waste Collection Infrastructure Across Entire University.</b>                      Overhaul existing front-of-house trash, recycling, and organics infrastructure with new R/O/T (recycling/organics/trash) system across 200 buildings and outdoor space, leveraging the new infrastructure standards.  <i>181 tons diverted or reduced   273 MTCO<sub>2</sub>E prevented</i></p>
<p><b>Capture and Recycle All Organics.</b>                      Integrate organics recycling as a new practice within university building zero waste infrastructure (recycling, organics, and trash) and divert all yard and grounds organics (leaves, brush, etc.) from the landfill.  <i>161 tons diverted or reduced   46 MTCO<sub>2</sub>E prevented</i></p>
<p><b>Enhance Zero Waste Toolbox.</b>                      Create a comprehensive toolbox (building from existing web presence) for all things zero waste that empowers the campus community with information, knowledge, and action steps.  <i>72 tons diverted or reduced   170 MTCO<sub>2</sub>E prevented</i></p>
<p><b>Create and Advance Policy Recommendations to Institutionalize University Zero Waste Practice.</b>                      Develop policies that will support circularity and zero waste practices across the campus that will be adopted through the UB Policy Process and ultimately incorporated into the UB Policy Library.  <i>Unknown impact / difficult to determine<sup>4</sup></i></p>
<p><b>Advance Zero Waste Through Campus Participation.</b>                      Require campus community to deposit their own trash, recyclables, and organics in centralized infrastructure, thereby creating better awareness by the individual and increased capacity for custodians to focus on critical infrastructure including restrooms and common areas.  <i>15 tons diverted or reduced   38 MTCO<sub>2</sub>E prevented</i></p>
<p><b>Institutionalize Custodial Zero Waste Practices.</b>                      Create and implement standard procedures and protocols for custodial teams to ensure management of resources are aligned with institutional zero waste goals.  <i>18 tons diverted or reduced   25 MTCO<sub>2</sub>E prevented</i></p>
<p><b>Capture and Reduce All Construction and Operational Landfill Material.</b>                      Waste created from construction, renovation, and other “back of house” materials must be tracked and reduced, repurposed, or recycled.  <i>Unknown impact / difficult to determine<sup>5</sup></i></p>
<p><b>Compostable To-Go Dining.</b>                      Ensure all single-use dining materials are compostable.  <i>28 tons diverted or reduced   11 MTCO<sub>2</sub>E prevented</i></p>
<p><b>540 TOTAL TONS DIVERTED OR REDUCED AND 737 MTCO<sub>2</sub>E OF AVOIDED GHG EMISSIONS</b></p>

<sup>3</sup> Impact depends on the practices pursued and extent of implementation by University at Buffalo.

<sup>4</sup> Impact depends on the policies pursued and extent of implementation by University at Buffalo.

<sup>5</sup> Impact depends on number of buildings renovated or built and availability of local markets. In-depth detailing of construction and demolition activities was outside of the scope for this report.



RRS calculated diversion and cost impact estimates for the recommendations that were developed to support UB's zero waste goals. The estimates for the recommendations were based on available data (e.g., hauler reports, published equipment and staffing costs, etc.). Estimates are conservative due to data limitations and may not reflect actual diversion and cost impacts when implemented by the University. RRS also conducted research on specific resources and their associated costs to implement each recommendation. This included research into staffing rates, materials, and other required resources.

RRS applied the University's recent waste and recycling composition data to the totals from the 2023 hauler reports to determine the estimated current diversion rate, which is **58 percent**. It is worth noting, however, that the amount of waste diverted does not account for any contamination, which averages 17 percent of inbound loads at recycling facilities<sup>6</sup> but can be as high as 25 to 35 percent in many areas. This material might end up being processed with other recyclables but eventually must be transported to the landfill or a waste-to-energy facility as residue.

Additionally, RRS developed a matrix to assess each strategic priority for its feasibility and ease of implementation. The criteria RRS used to put together the matrix were the following: tonnage impact, amount of campus training needed, environmental impact, operational impact, immediate financial impact, and ongoing financial impact.

The total impact for the ten strategic priorities is the potential to **divert or prevent 540 tons of waste and prevent 737 MTCO<sub>2</sub>E**. The recommendations laid out in this report, if implemented, hold significant potential for immediate waste and GHG emissions reduction. Although the report details the ten main strategic priorities, it also includes several other opportunities and actions the University can take to get closer to 90 percent diversion by 2030.

## STRATEGIC PRIORITIES AND DETAILED IMPLEMENTATION PLAN

RRS provided a detailed implementation plan for each strategic priority, which includes actions and next steps, timelines and major milestones, identification of which

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<sup>6</sup> Mouw, Scott. *The State of Curbside Recycling in 2020*. The Recycling Partnership, 13 Feb 2020. <https://recyclingpartnership.org/stateofcurbside/>

stakeholders to engage, and what the intended outcome is. This section is intended to provide UB with a launching point for programmatic development and implementation around each strategic objective. An overview of the timeline for each recommendation is

included in Table 3. Many of the strategic priorities call for immediate action and are intended to be implemented and produce meaningful impact in the next few years so UB can achieve 90 percent diversion by 2030.

Table 3: Timeline for strategic priorities.

STRATEGIC PRIORITIES	2024	2025				2026				2027
	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	CY
DEVELOP STRONG MANAGEMENT & METRICS ACROSS ALL ZERO WASTE INITIATIVES										
CREATE STANDARDIZED & UNIFIED ZERO WASTE INFRASTRUCTURE FOR UB										
ACQUIRE & DEPLOY NEW ZERO WASTE COLLECTION INFRASTRUCTURE ACROSS ENTIRE UNIVERSITY										
CAPTURE & RECYCLE ALL ORGANICS										
ENHANCE ZERO WASTE TOOLBOX										
CREATE & ADVANCE POLICY RECOMMENDATIONS TO INSTITUTIONALIZE UNIVERSITY ZERO WASTE PRACTICE										
ADVANCE ZERO WASTE THROUGH CAMPUS PARTICIPATION										
INSTITUTIONALIZE CUSTODIAL ZERO WASTE PRACTICES										
CAPTURE & REDUCE ALL CONSTRUCTION & OPERATIONAL LANDFILL MATERIAL										
COMPOSTABLE TO-GO DINING										
ONGOING: TRACK DATA & MONITOR PROGRESS										
ONGOING: EDUCATE & COMMUNICATE EXPECTATIONS TO UB COMMUNITY										





Figure 5: Waste sorters at the UB waste audit.

## CONCLUSION

Implementing the strategic priorities laid out in this plan and building upon the circularity work achieved over the past ten years will provide UB with a feasible approach to reach 90 percent diversion. UB's commitment to rethinking the way it consumes and disposes of resources and to shifting away from a linear disposal model to a circular one in which materials are introduced back into the economy through reuse and recycling is a key component of this work. The support demonstrated by top-level leadership provides a unique opportunity to leverage both available funding and human capital to accomplish significant improvement in a short period of time. Through engagement of campus stakeholders, the creation of working groups, and a willingness to work towards these recommendations, the long-term collaboration needed to implement these

strategies is achievable for UB and will demonstrate that the University is positioning itself to become a leader in the fight against climate change.

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The University is positioning itself to become a leader in the fight against climate change.

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For the full report, please email Erin Moscati, Zero Waste Manager, at [emoscati@buffalo.edu](mailto:emoscati@buffalo.edu)