President's Committee on Landfill Waste Reduction

Recommendations Report

Prepared for

President Mark S. Schlissel

By

The President's Committee on Landfill Waste Reduction

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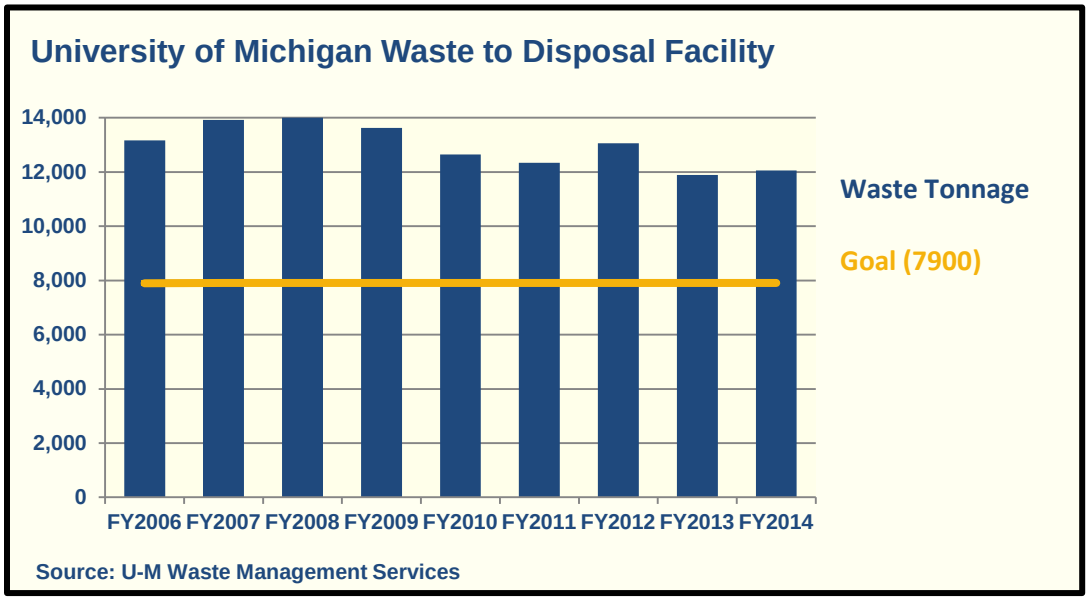
Executive Summary: In 2011, the University of Michigan established a sustainability goal of reducing the amount of solid waste sent to disposal facilities by 40% by 2025 from a 2006 baseline, with a guiding principle of pursuing purchasing, reuse, recycling, and composting strategies toward long-term waste eradication. In this case, "disposal facilities" is defined as landfills and incinerators.



The waste reduction committee chose not to recommend a change in the goal as it will, in its current form; challenge the University community to make fundamental changes in how waste is treated and have a significantly positive impact upon the environment. However, it is important to note that, given existing conditions, this goal will require a significant investment and effort to achieve. Additional challenges stem from the possibility of significant campus growth between now and 2025. New technologies and opportunities, however, may present themselves in the next 10 years which will make achieving the 40% waste reduction goal more realistic.

Based on a review of current and planned campus programs and building on the earlier work of the Campus Sustainability Integrated Assessment, it became clear that recycling and composting were the main two areas where relevant data could be accessed. However, the committee recognizes that while lacking empirical data on purchasing and reuse, these are two additional important areas where actions should be taken.

A total of 32 actions were identified. Each action was ranked according to the effort and investment required as well as its impact toward achieving the waste reduction goal. Rather than eliminating any of the actions, the committee decided to further refine and regroup them into the five recommendations below:

Description of Proposed Action	Expected Contribution to Overarching Goal	Challenges and/or Concerns Associated with Implementation	Back-of-Envelope Cost Estimates
Establish University-wide recycling/composting/waste bin and signage standards	Unknown but could increase participation in programs significantly.	Conflicting individual building/department signage and furniture standards. Several options will have to be available.	Could be phased. Total cost in excess of $1M with labor included.
Conduct a detailed study of the waste stream and appoint a full time sustainability coordinator for the Hospitals and Health Centers	Unknown, but necessary to determine the divertible portion of the HHC's waste stream.	Funding the study and changing purchasing and disposal behaviors of staff and patients. Once study is complete, implementation costs and behavior change.	Study cost $200K. Coordinator cost $60K plus benefits
Implement a University-wide organics composting program and centrally fund hauling & tipping fees.	At least 380 tons annually; possibly up to 850 tons annually plus possible 460 tone HHC contribution.	Contamination of compostables by non-compostable items. Program cost with possible central funding. Vendor participation. Ongoing training and education to the campus community.	HHC unknown, Campus one-time $400K, Campus annual costs $200K with $20K payback
Implement purchasing and reuse policies to support waste reduction.	Min 133 tons. Additional unknown	Construction of a new reuse facility would be costly. Subsidizing costs for moving material to reuse facility. Consistent policies across campus.	$15K to $13.3M depending on action
Implement educational and outreach programs to the University community to support program participation and report progress toward the goal.	Unknown but has the substantial potential.	Funding and dedicated time for orientation events to promote "zero waste." Creating and delivering reduction messages and tracking data. Coordinating waste reduction efforts across campus	Administration $50K. Others unknown

Introduction: In 2011, the University of Michigan established a sustainability goal of reducing the amount of waste sent to disposal facilities by 40% by 2025 from a 2006 baseline, with a guiding principle of pursuing purchasing, reuse, recycling, and composting strategies toward long-term waste eradication. In this case, “disposal facilities” is defined as landfills and incinerators.

The committee was charged with the following:

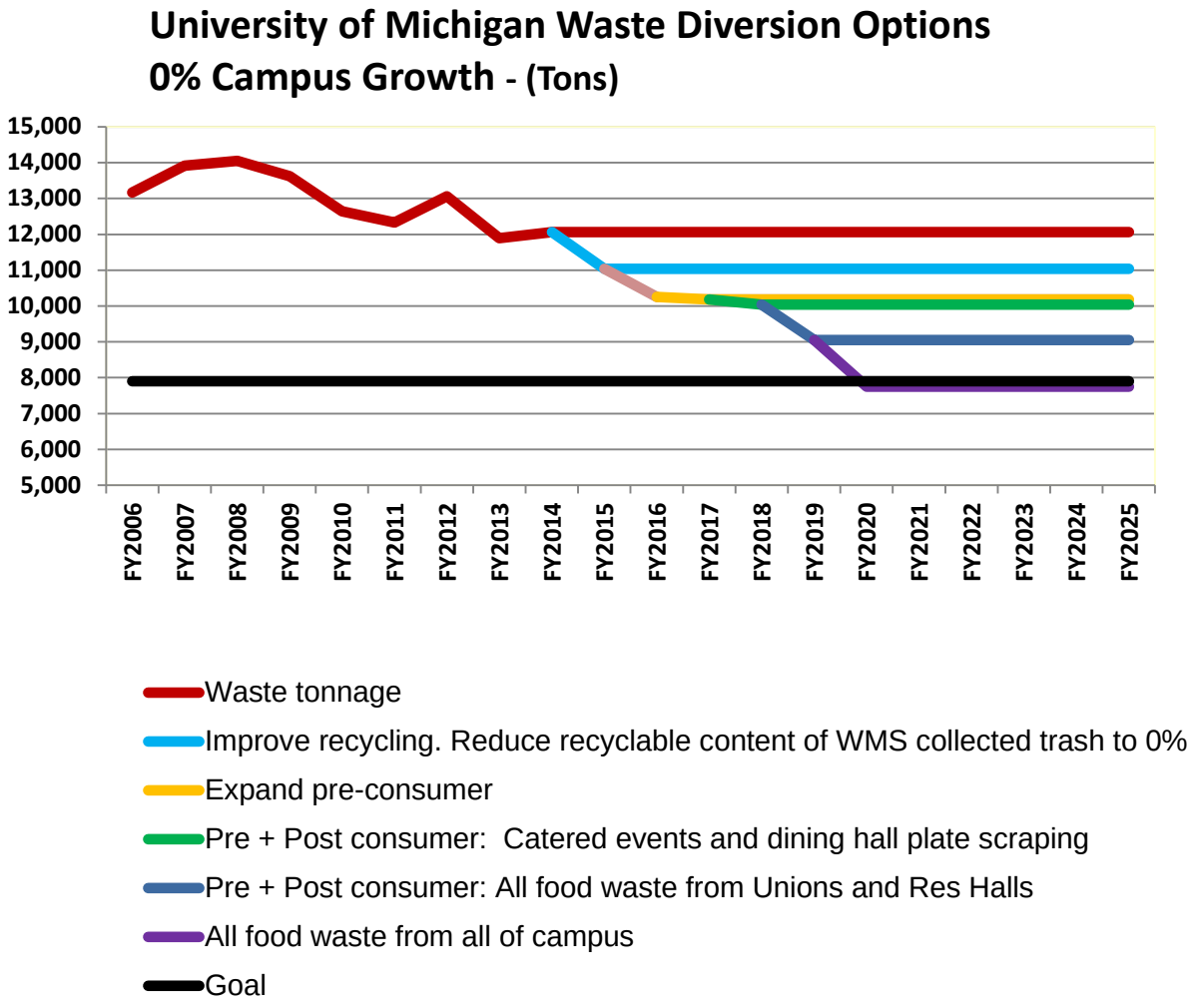
- Review current programs/plans and their impacts on progress toward the goal,
- Identify and discuss a range of potential options (e.g. technical, behavioral, political) for making significant progress toward achieving the goal, building on the earlier work of the Campus Sustainability Integrated Assessment,
- Develop a high-level plan for achieving the goals, that:
    - Includes a high-level analysis of strengths, weaknesses, opportunities, and threats (SWOT) to help prioritize pathways for making progress based on balanced consideration of wide-ranging factors (e.g. potential: sustainability impact, high-level cost estimates (capital, operating expenses), regulatory considerations, technical feasibility, political feasibility, research and student learning opportunities, etc.);
    - Identifies U-M policies and practices and external conditions that may impede progress;
    - Proposes potential actions and approaches to meliorate the impediments; and
    - Proposes an ongoing role for faculty/staff/student working groups around the goals.
- In light of the above, assess the current goal and recommend any necessary changes, and
- Report outcomes via meeting minutes and final reports.

In order to meet this charge, the committee divided the topic of waste reduction into 3 subcategories, each becoming the central topic of a monthly meeting:

- Composting
- Recycling
- Waste Reduction/Reuse/Purchasing/Behavior

A review of the current state of each of these areas was presented, as well as projections on how program expansion might impact the goal. It became clear that data relevant to the reduction goal was only available for recycling and composting. Based on that data, the committee developed a tiered approach identifying the easiest to the most difficult actions concerning recycling and composting toward achieving the goal.

The graph below illustrates this tiered approach. Given the data available, it is important to note that the data assumes 100% compliance with these actions and no significant campus growth. Data for the Hospitals and Health Centers (HHC) was not available and is not accounted for in this graphic; however, there is likely significant opportunity for landfill waste reduction in the HHC. The HHC does not include the Medical School or any HHC facilities outside of Ann Arbor.



Next, the committee reviewed the respective recommendations presented in the Campus Sustainability Integrated Assessment. Finally, new ideas were brainstormed on how each of these programs could be expanded. Environmental, behavioral and financial impacts of each idea were then discussed, allowing for development of what were to become the initial recommendations.

Initial recommendations were evaluated by the committee based upon strengths, weaknesses, opportunities and threats. Committee members then individually prioritized these recommendations on a scale of 1 (highest priority) to 5 (lowest priority). Top actions will be easier implement while lower actions will require a greater financial and behavioral investment.

The 32 initial actions were further consolidated into the 5 broad recommendations shown in the summary below. The full list of actions and their ranking can be found in Appendix A.

- Establish University-wide waste/recycling/compost bin and signage standards.
- Conduct a detailed study of the waste stream and appoint a full time sustainability coordinator for the Hospitals and Health Centers (HHC).
- Implement a University-wide organics composting program and centrally fund hauling & tipping fees.
- Implement purchasing and reuse policies to support waste reduction.
- Implement educational and outreach programs to the University community to support program participation and report progress toward the goal.

The waste reduction committee chose not to recommend a change in the goal as, in its current state; it will challenge the University community to make fundamental changes in how waste is treated while having a significantly positive impact upon the environment. However, it is important to note that, given existing conditions, this goal will require significant investment and effort to achieve. Additional challenges stem from the possibility of significant campus growth between now and 2025.

Recommendation 1: Establish University-wide waste/recycling/compost bin and signage standards.

Description: The University of Michigan began recycling on campus in 1989. Since then, a variety of different styles, colors and sizes of recycling bins and lids have been purchased and distributed across campus and the Hospitals and Health Centers (HHC). Additionally, a wide variety of recycling bin labels and signs have been created and posted on or near these bins. These variations have led to confusion among campus community members regarding which items are recyclable and where to place them.

In order to improve the ease of preferred waste (e.g. recyclables, compostables) disposal at the University, standards should be established regarding all waste collection bins, including bin color, size, material and lid opening shapes. Standards should also be established regarding all waste labeling and signage including colors, fonts and wording as well as their placement in relation to the containers.

Estimated Contribution to Goal: Unknown but would increase participation in recycling and composting by making proper disposal an automatic behavior.

Challenges and/or Concerns: Anticipated challenges to implementing this recommendation include:

- Many departments have their own signage and furniture standards.
- Gaining consensus among stakeholders without establishing a long list of exceptions that would render the standards useless.
- Financial impacts associated with implementing the standards, once they are established. These impacts include the cost of new bins and lids, new labels and signs and the labor required to adhere to the standard.
- Mobilizing necessary campus community members to remove non-conforming bins, lids, labels and signs and replace them with those that meet the standard by an agreed-upon deadline.

Cost Estimates:

- Establishing standards: Unknown
- Meeting established standards:
    - New recycling bins & lids: approximately 6,000 bins at $150 each: **$900,000**
        - Note that the total number of bins and lids to be replaced is estimated and unit prices can range from $50 - $600.
    - New labels & signs: approximately 6,000 labels & signs at $5 each: **$30,000**
    - Labor: Unknown

Recommendation 2: Conduct a detailed study of the waste stream and appoint a full time sustainability coordinator for the Hospitals and Health Centers (HHC)

Description: The U-M Hospitals & Health Centers (HHC) have taken significant steps to reduce their overall waste stream, including recycling many plastic products, reformulating and reducing operating room kits, and establishing a program for reprocessing SUDs (single use medical devices) in lieu of using a medical device once and then disposing of it. Other formidable programs in 2014 include donating unexpired/unopened consumable clinical supplies, medical equipment, and furniture as well as diverting worn and damaged linens from the landfill to a company which recycles them into rags.

Though work to date is important, the HHC generates approximately 44% (5,300 tons) of the total waste from campus and could offer a substantial contribution to the goal with improved recycling and composting. The unique nature of medical waste generated by the HHC's 24-hour operation presents challenges from a waste diversion perspective however regulated waste accounts for a small percentage of their total waste stream. For the purposes of this report, the HHC does not include the Medical School or HHC operations outside of Ann Arbor.

The following recommended actions from the committee have been identified in order for U-M to make significant progress toward the long term waste reduction goal.

Perform Detailed Waste Analysis: Hire a consultant with subject matter expertise to perform a detailed analysis of the HHC's waste stream and current waste collection/disposal operation. Analysis would identify currently non-regulated medical waste materials that could potentially be diverted from the trash stream through recycling, composting, product substitution, or other methods. Analysis would identify required changes to current purchasing and waste disposal procedures that would be required to reach diversion objectives. Campus-wide education programs, bin and signage standardization, composting, and purchasing changes described in the other four waste reduction recommendations, as well as incorporating single stream recycling, would be reviewed as part of this study.

Analysis would provide cost estimates for all recommendations including product substitution, changes to current disposal procedures, and waste stream management requirements.

Appoint a Full Time Sustainability Coordinator: The HHC will require a full time coordinator to manage requirements of a new and demanding waste diversion program. Duties may include development of necessary Requests for Proposals (RFP), overseeing consultant projects, implementing recommendations, developing and administering training programs, and continued reporting and management of this and other sustainability efforts. It has been suggested that the lack of a dedicated FTE in this role has stagnated progress historically.

Estimated Contribution to Goal: **Unknown, but necessary to determine the divertible portion of the HHC's waste stream.**

Challenges and/or Concerns: Anticipated challenges to implementing this recommendation include:

- Waste separation will be required in patient care and operating rooms, presenting space and procedural challenges for staff.
- Robust initial and long-term training will be required for clinical and non-clinical staff.
- Engaging vendors to identify potential product substitutes.
- Identifying markets and haulers for recyclable materials.
- Capital investment required for additional waste collection bins.
- HHC cost cutting (VMI) initiative may be a barrier.

Cost Estimates:

- Consultant: **$200,000**
- FTE**: $60,000** (not including benefit package)

Recommendation 3: Implement a University-wide organics composting program and centrally fund hauling & tipping fees.

Description: Composting, the managed decomposition of organic material into a nutrient-rich soil amendment, is an integral component to reaching the University of Michigan's waste reduction goal. While the composting potential of the Hospital and Health Centers (HHC) has yet to be determined; it is estimated that 34% - 42% of the material currently being sent to landfill from campus can potentially be composted.

Presently, only a marginal amount of the University's compostable waste is diverted from the landfill. For example, the Ross School contracts with a third-party vendor to collect and process its compostable waste. In addition, food and other compostable waste from zero-waste campus events, as well as animal bedding, are sent to the City of Ann Arbor's compost site. Michigan Dining has piloted waste pulper systems in two residence halls which have proved effective for both pre and post-consumer collection but have a high installation and maintenance cost. A low tech solution with collection bins may be the best approach and is currently utilized in the remaining food operations. It is important to note that the committee strongly recommends that any composting program be rolled out using a tiered approach, with low cost/low risk of contamination areas (like pre-consumer food waste composting) being targeted before higher cost/higher risk of contamination areas (like post-consumer food waste composting in retail areas) are included.

Pre-consumer food waste can be collected in food service operations, with a low chance of contamination. Currently, pre-consumer food waste is collected in all Michigan Dining facilities, but has yet to be expanded to most outside food vendors operating on campus and the HHC. Private vendors have been reluctant to participate in the program so it may become necessary to require participation through contracts. It has been estimated that 460 tons of food waste are generated by the HHC annually however the percentage of pre-consumer food waste is unknown. The proposed waste study in Recommendation 2 will detail the potential pre- and post-consumer contribution of the HHC's waste stream.

While collection of **post-consumer food waste** for composting is currently being implemented in all of Michigan Dining's operations, private vendors have been reluctant to participate in the program. Including a provision in vendor contracts requiring them to collect pre- and post-consumer food waste will help divert organic waste from the landfill. It may be necessary to establish standards for containers and utensil to insure they can be composted.

U-M Waste Management Services, the department responsible for hauling food waste from campus locations to the compost site, currently passes all costs onto participating customers. These costs include labor, equipment and tip fees (fees charged by the compost site to dump, or "tip," material at the site). For the past 3 years, the charge to participating units has been $12.50/35-gallon cart/pickup. When compared to the $6.76/loose cubic yard charge for trash, it is not surprising that cost, to date, has been the primary reason cited for units not participating in the food waste composting program. **Central funding** for this program would remove this barrier for units and increase participation in the program.

Estimated Contribution to Goal: 850 tons annually plus possible 460 tons HHC contribution, once fully implemented

Challenges and/or Concerns:

- Establishing a central fund for hauling & tip fees while ensuring that this funding applies to both general fund and auxiliary units.
- Ensuring that there is no contamination (i.e. non-compostables) mixed in with the food waste. There is no infrastructure or system in place to sort unacceptable items from the compostables waste stream.
- Scheduling and administering food waste collection training for staff and outside vendors will be required on an on-going basis as new staff and vendors are introduced to campus.
- It is undetermined who will pay for the pre-consumer food waste collection bins and hauling charges for outside vendor food service operations. If the vendors are responsible for the cost, it is likely that this cost will be passed along to U-M through their contracts.
- Identifying a funding source for additional costs associated with food waste composting programs in the HHC and M Dining, including collection bins, signage, compostable disposables, etc.
- Ongoing training and education to the campus community on how to compost, minimize contamination, etc.
- An alternative to composting is directing organic-rich constituents to an anaerobic digester. Establishing a digester for UM compost alone is not feasible given the facility costs and the amounts of compost needed however, the city of Ann Arbor is considering this strategy. Coordination with the city is key in shaping this possible strategy with UM.

Cost Estimates:

- Food waste collection from the HHC: **Unknown**
- Ongoing training: **$13,000 annually**
- Amendments to contracts: **Unknown**
- Food waste collection to all of campus excluding HHC: FY 14 charges to campus for food waste composting were approx. $40,000. Expanding service to all units, however, may require new equipment and/or an additional staff member. Based upon a 2011 study provided by Resource Recycling Systems, Inc., the annual collection costs associated with full rollout of the recommendations presented here could be approx. **$200,000 annually plus one time equipment costs of $350,000**.
- Collection bins, signage, compostable disposables: **$50,000**
- Diverting these items from the landfill will result in approx. **$20,000** less in landfill tip fees annually, and will likely save more as landfill tip rates increase.

Recommendation 4: Implement purchasing and reuse policies to support waste reduction.

Description: The committee recognizes that recycling and composting infrastructure and preferred disposal programs will not be enough to reach the waste reduction goal, but a reuse culture and purchasing practices that promote and encourage the acquisition of sustainable and reusable goods will have an effect. High level policy support beyond Finance Procurement and Plant Building and Grounds Services will be crucial to ensuring that the university community participates in these programs.

Campus Sustainability Integrated Assessment (CSIA)

Consistent with the Integrated Assessment recommendation to perform an evaluation of the Procurement Services Property Disposition facilities, business model, and current systems and software, and this team suggests that we further investigate some of those recommendations. The Michigan State University Surplus Store and Recycling Center is cited as a leader in this area with a co-located recycling and surplus sales operation that keeps a greater percentage of revenue from surplus sales and also offers moving services at no cost to departments.

- Property Disposition resides in a metal structure that was designed for U-M Plant Department storage on north campus in 1967, and it is not well suited for a retail surplus sales operation. A more suitable facility, co-locating recycling and surplus sales, would be desirable however it would require a substantial investment.
- If Property Disposition had more staffing, possibly funded by an increase in the percentage of sale proceeds kept, moving services could be provided to U-M departments at no cost. Removing the moving obstacle would encourage departments to purchase furniture and equipment, and encourage departments to not 'stockpile' unused surplus.
- Purchase a new Point of Sale system that will integrate existing PeopleSoft Asset Management data with the declaration of surplus process. This would help to maximize the utilization and sharing of equipment already owned by U-M, plus allow for querying by departments when they want to buy a specific item.
- Increase visibility through marketing, new outreach efforts, and the utilization of electronic media.

Estimated Contribution to Goal: Promote a reuse culture, with an unknown volume reduction in landfill waste. Total wastes landfilled from Property Disposition in 2014 was **133 tons**.

Challenges and/or Concerns: Anticipated challenges to implementing this recommendation include:

- Construction of a new facility would be costly
- Subsidization funding for moving may be required

Cost Estimates:

- Property Disposition point of sale system software/hardware + PeopleSoft Asset Management integration -- *Surplus Property Software, Inc* estimate **$58,700** (potential modifications requirements unknown -- **$0 - $30,000**)
- MSU's 74,000 square foot Surplus Store and Recycle Center cost **$13.3 M** in 2009. It houses the MSU Surplus Store, recycling operations, an education center, storage areas for compost and metal scrap, a truck scale, and space for roll-off and semi-trailer storage containers.
- Marketing costs would be in the **$15,000 to $40,000** range.

Other things to consider at the unit level, supported by central policies:

- Disposable options made less desirable with reusable options centrally subsidized, when cost is prohibitive.
- Limit supply deliveries for some non-urgent commodities to once a week, instead of next day.
- When possible, environmentally preferred products (EPP) and services should be required.
- Partner with other institutions to negotiate better pricing.

Challenges and/or Concerns: Anticipated challenges to implementing this recommendation include:

- Defining policies that meet diverse university community requirements - athletics vs academic and healthcare vs research
- Policy compliance across campus, given varied organizational missions and needs
- Compliance will be difficult to enforce
- Current culture promotes organizational autonomy
- Exceptions will be expected

Recommendation 5: Implement educational and outreach programs to the University community to support program participation and report progress toward the goal.

Description: Active participation by U-M community members is critical for success in reducing campus waste. Developing and implementing a robust education program for the campus community on the proper recycling and waste disposal actions is critical. A high-visibility awareness and educational campaign across campus will establish social norms for participation. In addition, methods to track and publicize participation will assist community members in initiating and maintaining waste reduction goals. Finally, an effective route for changing campus attitudes involves the introduction of new community members to the importance of waste reduction. Holding "zero waste" orientation events will effectively communicate the U-M's commitment to waste reduction by demonstrating the target behaviors in practice. Specific programs to implement include:

- Publicize waste reduction progress for each facility to localize responsibility for participation
- Expand and promote waste reduction in a "sustainable workplace" education program
- Orient new faculty, staff, and students to waste reduction goals through "zero waste" orientation events
- Incorporate MHealthy style programs that offer modest financial incentives for participating.
- Public service announcements at sporting and other major events with testimonials from local celebrities and other public figures.
- Build on and expand existing programs such as Recycle Mania, Earth Day, and Zero Waste events.

Estimated Contribution to Goal: Unknown

Challenges and/or Concerns:

- Additional funding and dedicated time for orientation events to promote "zero waste."
- Creating and delivering reduction messages and tracking data for greatest impact.
- Coordinating waste reduction efforts across campus (e.g. differing rules for campus vs. HHC vs. leased space, etc.).

Cost Estimates*:* Estimate for administering the education and outreach program is $50,000. Estimates are unknown for the other portions.

Appendix A: Recommendations ranking

Proposed Action 1: *Establish University-wide standards for waste collection bins & signage.*	
Establish University-wide standards for waste collection bins & signage	5
Proposed Action 2: *Conduct a study of the Health System and Hospital waste.*	
Conduct waste audits in Health systems and reseach facilities to ID opportunities	8
Move Health system to single stream recycling	8
Estabilsh sustainabiliy coordinator in Health System and other large units to work with central authority	10
Proposed Action 3: *Implement a campus wide composting program*	
Systematize collection of pre-consumer food waste for Health System	7
Systematize collection of pre-consumer food waste for campus vendors	8
Fund all composting operations centrally vs fee to participate	10
Systematize collection of post consumer food waste as part of vendor contracts	11
Systematize collection of post consumer food waste in Dining Halls	11
Systematize collection of post consumer food waste in Health System	12
Develop tiered approach to all compost initatives based on ease of implementation and costs	12
Partner with city/county on bio-digester and other regional waste reduction options	13
Expand collection of pre-consumer food waste to entire building where compost is currently being collected	14
Conduct study for paper towel composting	14
Pilot pre-consumer food waste collection in facilities not serviced	17
Proposed Action 4: *Implement purchasing and reuse policies to support waste reduction.*	
Enhance procurement website to include environmental rating for products	12
Make less sustainable product options less attractive	12
Investigate sustainability standards for catering contracts	12
Promote Property Disposition as a viable option vs new purchases on furniture/equipment	13
Mandate zero waste for events on campus	14
Promote paperless activity, work with units through central authority	14
Promote/establish programs to reduce packaging	14
Subsidize moving costs for delivery to Property Disposition	18
Expand and promote office supply reuse program	19
Expand and promote Mbay, on-line trading website	19
Promote reuse of research and other expensive equipment (similar to Mbay)	20
Bottle return station at vending sites	25
Proposed Action 5: *Implement programs to educate the campus on waste reduction and track progress toward the goal.*	
Conduct ongoing promotional campaign for waste reduction, recycling, composting	8
Provide waste reduction education at new student and employee orientations	10
Expand existing Plant Blue programs, add waste reduction metrics to facility (energy use) performance posters	12
Develop incentive programs around waste reduction similar to Mhealthy	13
Expand and promote sustainable workplace program	14

Rankings were ordered by Highest (1) to Lowest (5) by each committee member. The summed totals are shown above. Each of the 32 recommendations was then incorporated into the 5 broad recommendations.

Appendix B: Committee Members

John Lawter, Plant Building & Grounds Services (Co-Chair)

Olivier Jolliet, School of Public Health (Co-Chair)

Tracy Artley, Plant Building & Grounds Services

Andy Berki, Office of Campus Sustainability

Drew Horning, Graham Institute

Mary Ellen Lyon, Procurement

Steve Mangan, Student Life

Tom Peterson, Hospitals and Health Centers

Colleen Seifert, LS&A - Psychology

Hannah Sherman, Student

Brian Talbot, Ross School of Business - Operations Management

Monica Walker, Student

Chris Wolff, Student

Dimitrios Zekkos, College of Engineering - Civil & Environmental