

# ZERO WASTE Campus Toolkit



What goes around comes around

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## **OVERVIEW**

This toolkit is intended to be used by colleges and universities as a guide to creating a Zero Waste Campus. This toolkit contains resources regarding the concept of Zero Waste, Zero Waste management practices and a sample Zero Waste campus pledge and model policy.



## HOW TO START A CAMPUS ZERO WASTE PROGRAM

Starting a campus Zero Waste program is an asset to a collegiate sustainability effort and an opportunity to reduce greenhouse gas production and create campus efficiencies. Whether one is an administrator or a student, starting this effort, requires a systematic approach. A full description on how to initiate this effort can be found at: <u>https://cpfm.uoregon.edu/ze-rowaste-resources</u>

Zero Waste is an important journey for college campuses to undertake as it is a vital component of a healthy future for generations to come.



## DEFINITIONS

CARBON FOOTPRINT: Total amount of greenhouse gas emissions resulting from an organization, event, product or person that is then converted to a carbon equivalent to demonstrate the impact to climate change.

COMPOST/COMPOSTABLES: Organic materials that can be managed through natural processes to become a useful soil amendment. These materials can include compostable items such as paper plates and food ware that is approved by Cedar Grove Composting or Biodegradable Products Index (BPI).

DISPOSABLES: Materials that are typically made for single use to be discarded as a waste item after use.

DURABLE GOODS: Items that have a useful life of two years or more and are replaced infrequently and/or may require capital program outlays. These also are items that can be repaired and reused through many avenues on campus. Examples include but are not limited to: furniture, office equipment, appliances, external power adapters, televisions, audiovisual equipment, reusable food ware (plates, cups, utensils), refillable drinking containers, etc...

EPP: Environmentally Preferable Purchasing is a strategy and policy from the EPA. To learn more about this practice, go to: <u>https://www.epa.gov/greenerproducts/about-environmental-ly-preferable-purchasing-program</u>

EPR: Extended Producer Responsibility is a strategy designed to promote the integration of environmental costs associated with goods throughout their life cycles into the market price of the products and to establish mechanisms for producers to manage resulting product and production waste.

FEEDSTOCK: Raw material (could be virgin or recycled feedstock) used to make products.

GHG: Greenhouse gasses (i.e. methane, carbon dioxide) that are contributing to climate change through atmospheric heating.

GMP: Glass, metal, plastic

INCINERATOR: Furnace or container utilized for burning waste materials sometimes referred to as gasification, pyrolysis, waste to energy, biomass burners and Zero Waste to landfill. This has been touted as a Zero Waste practice, but in reality, it is an alternative to landfilling that requires large quantities of waste.



INPUTS: Items going into a system.

LANDFILLS: Waste disposal sites where materials are buried. Landfilling is the oldest form of waste treatment. Landfilling is becoming a less viable strategy for disposing of waste, as many landfills have met capacity and others have been closed due to toxic leaching.

LIFE CYCLE ACCOUNTING (LCA): Life Cycle Accounting calculates the true cost of material components of products, from feedstock, resource extraction and carbon footprint to manufacture, transportation, product use, disposal or recycling, throughout the product's lifetime. This allows for a comparison between similar products to determine which is the more efficient. The most efficient product is not always apparent at the start of an endeavor. Knowing the true cost of products can more accurately shape policies and designs. Search for life cycle accounting at <a href="http://ohp.parks.ca.gov/?page\_id=25083">http://ohp.parks.ca.gov/?page\_id=25083</a>

MATERIALS MANAGEMENT: See Zero Waste and Materials Management in definitions.

ONGOING CONSUMABLES: Materials with a low cost per unit that are regularly used and replaced through the course of business. These include paper, toner cartridges, binders, batteries, and desk accessories.

OVERCONSUMPTION: When the rate of resources used becomes greater than the sustainable capacity rate of an ecosystem.

RECYCLING: Collection, reprocessing, marketing, and use of materials that were diverted or recovered from the waste stream. Recycled materials are generally reprocessed in such a way that they become a feedstock to replace virgin raw materials in some production processes – often unrelated to their original use (e.g. plastic from bottles may become non-virgin plastic fibers for the manufacturing of carpeting). The highest use is to recycle the item into the same thing it was originally.



REUSE: Returns materials to active use in the same or related capacity and thus extends the life of materials that would otherwise be disposed. Examples of ongoing consumables that can be reused include: office supplies, equipment, binders, staplers, and other desk accessories, furniture, and vehicles -- whether reused on-site or donated or sold to other facilities.

SOURCE REDUCTION: Reduces the amount of unnecessary material brought into a building. Examples include: purchasing products that are designed with minimal packaging and what is left can be diverted through recycling, composting or reuse. Buying only items that are necessary but will not create (or will reduce) any waste through usage or end of life disposal.

WASTE: Comprises all unwanted materials including materials that can be reduced, reused, recycled or composted that was not captured in collection. Ideally in the case of Zero Waste, the term waste refers to all unwanted materials that are no longer a resource.

WASTE DIVERSION: A management activity that treats waste as a resource and keeps it out of the "waste stream". Examples are reuse, recycling and composting.

WASTE REDUCTION: Includes source reduction (through reduced consumption or less resource intensive products) and waste diversion through reuse or recycling.

WASTE REDUCTION PROGRAM: 1) Describes the organization's commitment to minimizing waste disposal through source reduction, reduced consumption, reuse, and recycling; (2) assigns responsibility within the organization for implementation of a dedicated program; (3) lists the general actions that will be implemented to reduce waste; and (4) describes tracking and review procedures to monitor waste reduction and improve waste reduction performance.





WASTE STREAM: The overall flow of waste (unwanted materials) from the building to a landfill, incinerator, or other disposal method.

WASTE TO ENERGY: An industrial process that burns waste and turns it into energy. This is a controversial practice that often is touted as a Zero Waste strategy. There are numerous concerns such as: cost to a community, requirements for large quantities of inputs and emissions, to name a few.

ZERO WASTE AND MATERIALS MANAGEMENT: The Concept of Zero Waste is a philosophy, a goal, and a set of procedures, practices, and behaviors designed to approach a net-zero environmental impact from consumption and waste. It incorporates the principles and the hierarchy of the three R's of: Reduction, Reuse, and Recycling/Composting. More specifically, striving for a state of Zero Waste (based on extensive research) involves:

- Reducing consumption as a first step towards reducing the amount of waste acquired and generated. Achieving Zero Waste requires making business decisions that prevent waste from being created in the first place by looking to the sources of waste generation, rather than merely reducing the downstream impacts of waste.
- Choosing products that are designed for durability and a long life products which have the potential for continued use and re-use, as well as eventual recycling at the end of their useful life.
- Maximizing reuse, recycling and composting opportunities, and minimizing waste with the goal of diverting 90% or more of the materials created from the landfill by 2020.
- Ensuring that no materials are landfilled (buried) or burned (incinerators, waste to energy facilities, biomass burners, pyrolysis, gasification), favoring anaerobic digestion for organic material processing while scrutinizing any available disposal technology for the absolute last bit of unrecoverable waste.

See conversion technologies (page 35)

## ZERO WASTE BUSINESS PRINCIPLES

http://zwia.org/standards/zw-business-principles/

The Planning Group of the Zero Waste International Alliance adopted the following Principles on April 5, 2005 to guide and evaluate current and future Zero Waste policies and programs established by businesses. These Zero Waste Business Principles will be the basis for evaluating the commitment of companies to achieve Zero Waste. These Principles will also enable workers, investors, customers, suppliers, policymakers and the public in general to better evaluate the resource efficiency of companies. For examples of businesses that have succeeded in diverting over 90% of their waste from landfills and incinerators, go to:

#### http://www.earthresource.org/zerowaste.html

1. Commitment to the triple bottom line - We ensure that social, environmental and economic performance standards are met together. We maintain clear accounting and reporting systems and operate with the highest ethical standards for our investors and our customers. We produce annual environmental or sustainability reports that document how we implement these policies. We inform workers, customers and the community about environmental impacts of our production, products or services.

**2. Use Precautionary Principle** - We apply the precautionary principle before introducing new products and processes, to avoid products and practices that are wasteful or toxic.

**3. Zero Waste to landfill or incineration** - We divert more than 90% of the solid wastes we generate from Landfill and Incineration from all of our facilities. No more than 10% of our discards are landfilled. No mixed wastes are incinerated or processed in facilities that operate above ambient biological temperatures (more than 200°F.) to recover energy or materials.

**4. Responsibility: Takeback products and packaging -** We take financial and/or physical responsibility for all the products and packaging we produce and/or market under our brand(s), and require our suppliers to do so as well. We support and work with existing reuse, recycling and composting operators to productively use our products and packaging, or arrange for new systems to bring those back to our manufacturing facilities. We include the reuse, recycling or composting of our products as a design criteria for all new products.

**5. Buy reused, recycled and composted** - We use recycled content and compost products in all aspects of our operations, including production facilities, offices and in the construction of new facilities. We use LEED-certified architects to design new and remodeled facilities as Green Buildings. We buy reused products where they are available, and make our excess inventory of equipment and products available for reuse by others. We label our products and packaging with the amount of post-consumer recycled content and for papers, we label if chlorine-free and forest-friendly materials are used.



**6. Prevent pollution and reduce waste** - We redesign our supply, production and distribution systems to reduce the use of natural resources and eliminate waste. We prevent pollution and the waste of materials by continual assessment of our systems and revising procedures, policies and payment policies. To the extent our products contain materials with known or suspected adverse human health impacts, we notify consumers of their content and how to safely manage the products at the end of their useful life.

7. Highest and best use - We continuously evaluate our markets and direct our discarded products and packaging to recover the highest value of their embodied energy and materials according to the following hierarchy: reuse of the product for its original purpose; reuse of the product for an alternate purpose; reuse of its parts; reuse of the materials; recycling of inorganic materials in closed loop systems; recycling of inorganic materials in single-use applications; composting of organic materials to sustain soils and avoid use of chemical fertilizers; and composting or mulching of organic materials to reduce erosion and litter and retain moisture.

8. Use economic incentives for customers, workers and suppliers - We encourage our customers, workers and suppliers to eliminate waste and maximize the reuse, recycling and composting of discarded materials through economic incentives and a holistic systems analysis. We lease our products to customers and provide bonuses or other rewards to workers, suppliers and other stakeholders that eliminate waste. We use financial incentives to encourage our suppliers to adhere to Zero Waste principles. We evaluate our discards to determine how to develop other productive business opportunities from these assets.

**9. Products or services sold are not wasteful or toxic** - We evaluate our products and services regularly to determine if they are wasteful or toxic and develop alternatives to eliminate those products which we find are wasteful or toxic. We evaluate all our products and offer them as services whenever possible. We design products to be easily disassembled to encourage reuse and repair. We design our products to be durable, to last as long as the technology is in practice.

**10. Use non-toxic production, reuse and recycling processes** - We eliminate the use of hazardous materials in our production, reuse and recycling processes, particularly persistent bioaccumulative toxics. We eliminate the environmental, health and safety risks to our employees and the communities in which we operate. Any materials exported to other countries with lower environmental standards are managed according to the current standards in the United States.





## THE GOAL OF ZERO WASTE

Zero Waste is a goal of creating Zero Waste through waste reduction practices that reduce consumption; purchasing durable goods that create opportunities for reuse and repair as to not consume more manufactured goods; and finally recycling and composting what absolutely must be discarded. Zero Waste practices focus additionally on sending nothing to the landfill or incinerator (including waste to energy, pyrolysis, gasification, biomass burners). This is referred to as No Bury, No Burn.

Zero Waste goes beyond the management of discards. It is a whole systems approach to the materials management. Zero Waste includes discard management through recycling and composting, but it also must incorporate waste reduction and environmentally preferred purchasing practices. The inputs are just as important as the outputs when designing a sustainable system.

# MAKE COMPOST NOT LANDFILLS

### **BENEFITS OF ZERO WASTE**

The environmental benefits of Zero Waste include: resource and energy conservation; waste and pollution reduction; and Greenhouse Gas (GHG) reduction. The Zero Waste strategy offers one of the easiest and cheapest ways of reducing a campus's contribution to GHG emissions. Methane from landfilling is one of the most significant Greenhouse Gases that are produced worldwide, second to CO2.

Beyond the environmental benefits, Zero Waste practices also lead to fiscal savings and system efficiencies. Reducing waste and consumption saves money and resources from having to purchase an item to manufacturing it in the first place. With Zero Waste, discards are viewed as a resource that can be turned into revenue for a campus. Or in the case of compostable material, for example, it can be used to make compost for the campus to use instead of buying it from an offsite source. Zero Waste practices further save money for a campus because the focus of this strategy seeks to identify and eliminate inefficiencies in the materials and waste management systems by centralizing these functions into one program. Zero Waste practices show students real world solutions to the endemic problem of waste and demonstrates effective whole systems approaches to manage consumption and disposal.

# INTEGRATING CAMPUS WASTE MANAGEMENT TO A ZERO WASTE SYSTEM

When transitioning to a Zero Waste Campus, it is most important to think about how the waste is created and how discards are managed. A key to having a successful Zero Waste system is for management of waste to be integrated into one central system while reducing and greening inputs through EPP practices. A centralized integrated zero waste system is established such that the collection of recycling, compostables and waste is all handled by one program. This creates efficiency, reduces worker injuries, and saves money. A Zero Waste campus would not have any stand-alone waste receptacles and desk side collection service of waste would be eliminated. Thus individual office waste materials collection, would become the responsibility of the building occupant to centralize materials. This practice would also create an opportunity for further waste reduction through individual responsibility.

Creating a solid waste operational strategy involves developing an "Integrated Discard Management" or "Materials Management" paradigm. Solid waste and zero waste would fall under one umbrella, with the custodians moving all discards from interior spaces to exterior central collection that is serviced by central collection routes. Integrating zero waste collection into existing building garbage collection is the key to creating an efficient cost effective system. On campus Zero Waste programs have opportunities to market materials for revenue. If a campus contracts out solid waste, recycling and composting services, opportunities lie in creating bids and contracts that favor zero waste. It is important to analyze all options to determine best practices that preserve resources, create effective systems and maximize value of materials.

## ZERO WASTE PLEDGE TEMPLATE

The College and University Recycling Coalition "Zero Waste Campus Pledge" sample is included in this toolkit on page 11. Ideally this type of pledge, would be included in all campus sustainability commitments and inventories, but can be utilized at an individual school as a declaration of the campus commitment to Zero Waste. This pledge can be changed and adapted to each school. Hopefully, being something that will eventually be introduced to campuses on a national level.

# ZERO WASTE POLICY TEMPLATE AND IMPLEMENTATION STRATEGIES

This sample policy template for a Zero Waste campus, contains a sample Zero Waste Campus policy modelled after the University of Oregon policy template. The toolkit also contains procedures and strategies followed by a resource list.

The Zero Waste Model Policy provides an umbrella for sub-policies to be created to support the overall Zero Waste campus effort. It is important to consider developing other policies that support the overarching goal of Zero Waste. Policies, such as comprehensive campus environmental policy, recycled paper policy, campus copy machine policy, and bottled water policy, are all potential opportunities to reinforce the campus efforts to be sustainable.

## College and University Recycling Coalition's Zero Waste Campus Pledge-TEMPLATE

As a committed leader in environmental and social stewardship the University of XXXX cannot ignore the adverse effects of the epidemic waste problem, overconsumption, and the current status quo waste management practices (landfill/burning) on the greater global community and environment. Therefore, the University of XXXX pledges to become a Zero Waste campus, to mitigate out consumption and responsibly manage discards, resulting in a 90% or greater rate of materials being diverted from landfill/incineration and reduced greenhouse gas emissions. This will be achieved through practices of resource reduction, environmentally preferable purchasing practices, eliminating over and unnecessary consumption, reuse of products, and recycling and composting of non-reusable products.

Be it resolved that this institution is committed to taking the following steps in pursuit of Zero Waste:

- a. Develop a comprehensive Zero Waste Policy for materials management on campus.
- b. Follow the Zero Waste business principles developed by the Zero Waste International Alliance. <u>http://zwia.org/standards/zw-business-principles/</u>
- c. Commit to diverting 90% of the campus associated waste from landfill/incineration by XXXX.
- d. Establish a Zero Waste culture on campus by integrating it into the curriculum and other activities on campus so that members of the campus community will leave as Zero Waste leaders.
- e. Track materials management and progress on goals and actions.
- f. Make policy and progress reports available to the public.

Signed,

XXXX

President of the College/University

Date

\*Policy modeled after University of Oregon policy template format

## MODEL MATERIALS MANAGEMENT AND ZERO WASTE POLICY

Last Updated:

Effective Date: TBD

**RESPONSIBLE UNIVERSITY OFFICE AND CONTACT PERSON(S):** 

XXXXX

Office Website URL: Policy Owner:

Email:

Phone:

#### POLICY NUMBER: TBD

#### PREAMBLE:

This policy exists to create a materials management and Zero Waste policy which includes procedures for all campus routine operations.

#### **REASON FOR POLICY:**

The University of XXXX acknowledges its roles and responsibilities as a member of the local community and the State of XXXX. With envornmental stewardship at the forefront of those responsibilities. This document sets out the University of XXXX vision, policies and procedures with regard to Materials Management with the end goal of Zero Waste as it relates to the operations, maintenance, and daily activities of the university.

This policy sets a goal of 90% waste diversion by the University of XXXX by June 30, XXXX with additional efforts to reach 100% initiated as technology becomes available.

For the purpose of this policy document, Zero Waste and Materials Management will refer to the procedures and practices designed to achieve a reduction in resource consumption, an increase in resource reuse, waste reduction, diversion and mitigation of greenhouse gas production.

The Zero Waste Policy will also reduce greenhouse gas production, conserve resources, streamline waste management costs, save money and create operational efficiencies, which is in sync with goals of the University of XXXX. These activities are intended as a hierarchy of approaches to Materials Management with the end result of Zero Waste.

#### **POLICY STATEMENT:**

The University of XXXX is committed to resource conservation, sustainability and environmental stewardship and will take the initiative to implement progressive methods of materials management and Zero Waste practices through: reduced consumption, environmentally preferable purchasing, resource conservation and Zero Waste materials diversion practices and opportunities in accordance with observed needs. While such needs vary among buildings and facilities, the goals of this policy include, but are not limited to:

- Building culture in regards to Zero Waste including: reduced consumption, waste reduction, sustainable purchasing, LCA, EPR, material reuse, product repair, waste diversion (including recycling and composting of materials)
- Development of infrastructure around a system of materials management and Zero Waste principles
- Accessibility, functionality and convenience of environmentally preferable purchasing policies and practices, on-campus including reduced consumption practices, reuse/ re-purpose opportunities, recycling and composting areas
- Updating waste tracking data and implementation of procedures laid out in this Materials Management and Zero Waste Policy

A study from the Environmental Protection Agency in 2009, shows that 42% of our nation's greenhouse gas emissions are a result of current, unsustainable materials management and overconsumption practices. This policy aims to address impacts on campus, as well as assist the campus population in improving waste reduction and diversion rates through minimizing the purchase/use of disposable materials and maximizing diversion from the landfill through re-use, re-purposing, recycling and composting of materials generated through campus daily operations.

#### http://www.oregon.gov/deq/FilterDocs/2050-GreenhouseGases.pdf

#### COMMITMENT TO MATERIALS MANAGEMENT AND ZERO WASTE HIERARCHY

The University of XXXX understands that daily campus management (including campus purchasing, building operations and maintenance), can generate significant quantities of waste and that waste can be a resource. As such, the University emphasizes the importance of waste reduction and reduced consumption, first and foremost. The University has, therefore identified waste reduction and diversion strategies that reduce the demand for new materials and the related harvesting or extraction of natural resources for manufacturing as a priority in developing a campus materials management and Zero Waste policy. Additionally, the University acknowledges that the disposal of solid waste by incineration or landfilling produces greenhouse gas emissions and should be avoided to the maximum extent possible. If disposal is necessary, the University recognizes that prior to choosing a final disposal method, conversion technologies and other strategies must be scrutinized and not impact the environment negatively.

The University will, therefore, manage its waste stream in an environmentally responsible manner by taking advantage of reduced consumption, resource conservation, waste reduction and reuse opportunities, followed by recycling/composting those materials which cannot be eliminated from the waste stream through purchasing efforts or reuse activities.

#### **EXCLUSIONS AND SPECIAL SITUATIONS:**

University of XXXX Policy Statements may not cover all administrative matters at the university. The intention of the University is to eventually have all Policy Statements housed within the Policy Library. However, in the transition phase, some statements may be located in other sources such as the Office of Academic Affairs, Business Affairs and Human Resources.

Some administrative information may not be formalized into Policy Statements and will be contained in handbooks, catalogs, etc...such as the Student Handbook.

#### **PROCEDURES:**

#### PUT LINK HERE to Procedures and Strategies for insitution

#### WHO IS GOVERNED BY THIS POLICY:

All staff, faculty, and students at the University, or anyone working on behalf of the University, who play a role in the evaluation, formulation, revision, approval, issuance or maintenance of University Policy statements.

#### WHO SHOULD KNOW ABOUT THIS POLICY:

All campus building occupants, personnel and administration.

#### **CROSS REFERENCE TO RELATED POLICIES:**

This policy exists, such that other sub policies related to campus materials management and Zero Waste, are encouraged to be created as supporting documents.

Currently at the University of XXXX, other related policies include:

Comprehensive Environmental Policy: Example: <u>http://policies.uoregon.edu/files/vpfa-policies/ch4i.html</u>

Recycled Paper Policy: Example: <u>https://policies.uoregon.edu/files/policy-library/uploads/Recycled\_Paper.pdf</u>

Environmentally Preferable Purchasing Policy: Example: <u>https://www.epa.gov/greenerproducts/about-environmentally-preferable-purchas-ing-program</u>

#### **REGULATIONS:**

The Materials Management efforts and Campus Zero Waste Program comply with all local, county, state, federal and university rules and laws in operating these programs including but not limited to: fire safety, OSHA standards, work rules, and material processing standards.

#### **PERFORMANCE METRIC:**

Performance will be tracked on a monthly basis using recycle, compost, surplus, landfill, haul tickets to calculate solid waste management performance on a volume or weight basis that is converted to a monthly, quarterly and annual diversion rate.

The University is encouraged to create a mechanism to track GHG reduction from Zero Waste practices and environmentally preferable purchasing. Additionally, the University is encouraged to work towards a tracking mechanism to document EPP and EPR.

This information will be used subsequently for other sustainability reporting mechanisms.

\*\*\*FOR USE EITHER AS ATTACHED TO THE POLICY OR AS A WEB LINKED DOCUMENT NOTED IN THE POLICY

## **PROCEDURES AND STRATEGIES**

Implement a materials management system to include environmentally preferable purchasing and an integrated waste management system. The resulting Zero Waste focus involves the entire campus community including building occupants and campus participants, through the aforementioned definitions, and following strategies and procedures:

## PURCHASING

Environmentally Preferable Purchasing (EPP) is the first step towards approaching a state of Zero Waste through a materials management approach with reduction/elimination of many products that would otherwise be destined for the landfill.

The University of XXXX endorses the following EPP principles:

- Reduce overconsumption and unnecessary spending through purchasing. Purchase what will be used and is needed. Establish rules that encourage saving funds for future use and capital needs, over "use it or lose it" budgeting policies.
- Maximize procurement of environmentally preferable products and services, favoring: durable, easily repairable and reusable products in place of disposables; and products that are refurbished and/or made from recycled materials.



 Integrate sustainability requirements into campus contracts and competitive bidding for material and services procurement, allowing for suppliers to meet these requirements such as:

Contracts that favor products, services and packaging that generate Zero Waste, that are durable, built for reuse and repair, are recyclable or compostable at end of life through the vendor and minimize waste production in product use (i.e. ensure all campus copiers are able to print double-sided, utilize 100% post-consumer paper, the company would take all toner bottles/laser printers generated from the use of the machine-for certified recycling and end of life product would be returned to the company for certified recycling of item).

Purchase items in bulk quantities which will not extend beyond their usefulness, obsolescence or technological life-span (e.g. purchasing enough supplies for current use instead of purchasing a 2-year supply of cartridges for a printer which will be replaced within that time period).

Any by-products (including packaging, supplies used in product/service, end use of item) would be required to be able to be diverted from the waste stream; favor manufacturers that have EPR take-back programs for materials generated in recurring use products (i.e. copy and laser toner cartridges) and for end use of item.

For items that utilize supplies (i.e. copy machines), ensure supplies are environmentally preferable products and that equipment can utilize these products (i.e. 100% post-consumer copy paper).

Require certification on all take back programs as to material make-up (of items/ equipment/supplies) and after-life diversion methods.

Require a minimum level of post-consumer recycled material content in all items purchased including: copier paper, furniture, industrial equipment, office supplies and other items, giving preference to items that contain maximum recycled content that does not compromise product integrity.

Purchase items that are low resource use and meet function specifications (i.e. using lighter weight waste collection bags will save money and reduce resource use).

Ensure that products and services are energy efficient, low VOC content and non-toxic.

Preference would be given to items and services available locally and then regionally, as much as possible.

 Utilize university purchasing power to target environmentally preferable products and services for volume-discounted pricing to create cost-competitiveness with conventional products and services.

- Employ principles of Life Cycle Accounting (LCA) in determining product or services for the University. This includes weighing the longevity, repairability, waste impact of each item and service before awarding contracts.
- For products and services without available environmentally preferable alternatives, the University will work with its existing and potential suppliers to leverage the University's purchasing power and market presence to request and develop sustainable choices.
- In the case of usable products for which there is no additional campus use, and/or a supplier does not provide a take-back program, the University will use other disposal methods, such as donation, existing campus-designated programs, or State surplus, in lieu of landfilling or incineration.
- Use of vending contracts to charge for waste generated and energy consumed due to contract (i.e. campus vending contract to pay for bottle/can waste generated from vending machine). Include energy costs of product or services while passing direct cost to vendor for utilizing plug in equipment such as beverage vending machines.
- Ensure all campus equipment that utilizes energy, operates in an energy efficient manner and contains energy saving features including equipment utilized in contracts and services involving off-campus providers.
- The University will create: accessible information; EPP tracking for all campus purchases; trainings that support this policy; and procedures for EPP to be utilized for the campus community and a focus group of all personnel whose jobs include purchasing.
- Encourage the development of purchasing tracking systems for all campus purchases that allow tracking of recycled content, take back programs and durables.
- The University will utilize vendor contacts to educate vendors on campus sustainability and EPP practices to encourage vendors to supply environmentally preferable products.

**RECYCLE ONLY** 

USE WISELY

**PAPER = TREES** 

## SOURCE REDUCTION

Reduction in consumption and therefore, reduction in waste is the first step towards achieving a state of Zero Waste. Materials which are not purchased, acquired, consumed, or otherwise brought into the waste stream do not become a part of that stream. The University of XXXX places primacy upon the following waste/consumption reduction approaches:

- Engage in environmentally preferable purchasing (EPP) strategies (pages 16-18).
- Utilize electronic and other paperless forms of communication, information dissemination, and documentation to the greatest extent possible including transitioning toward the use of electronic media for all university business (i.e. web-based catalogs, phone books, campus maps and planning documents).
- Reduce printing and/or print materials in the most environmentally responsible format (e.g. all printer and copier settings default to two-sided copying and printing, employing draft paper copies-reuse of non-needed one-sided already printed paper-for non-official business, use of soy based inks, etc.).
- Purchase chlorine-free paper made with non-virgin, 100% post-consumer content.
- Purchase other items and industrial/office equipment that contain a minimum of 50% post-consumer content as is possible.
- Purchase materials that are low density, using fewer materials to meet product specification.
- Install hand dryers in place of paper towel dispensers in campus restrooms, default to establishing composting of paper towels if hand dryers are not installed.
- Install energy-efficient lighting, turn lights off when not needed or not in use, and monitor for compliance.
- Require all faculty, students and employees leaving their offices for any length of time or facilitating the last class or meeting of the day, to ensure waste is removed from the room and energy conservation is in place, by turning off lights and other unneeded electronic equipment.
- Ensure all campus computer and electronic equipment is set to an energy saving mode and encourage all faculty, staff, administration and students to power off computers, printers and copiers at the end of the work day.
- Install refill spouts on all new (and needing to be replaced) drinking fountains.
- Eliminate all food service related styrofoam products.
- Compost all campus yard debris, utilize finished product as campus soil amendment, which supports an integrated pest management system to decrease pesticide use and negates necessity to purchase an outside product.
- Reduce use and purchasing of plastics to the greatest extent possible while implementing opportunities for the campus community to reduce plastic use such as: implement-



ing full compostable food ware at all food service locations, installing bottle refill stations throughout campus, eliminating plastic bags from all food service and retail locations, and encouraging elimination of plastic beverage containers sold through campus vending contracts.

- Ensure availability of water refill stations at all athletic and conference events utilizing compostable cups if necessary. For all campus catered events, offer free urns of drinking water for all participants while eliminating unnecessary bottled water as is possible.
- Ensure all food ware and other single use inputs are compostable and compatible with university's compost processing mechanism.
- Institute reusable options for to-go containers in all campus food service and housing locations.
- Provide all new University employees and students with reusable accoutrements such as: reusable/refillable water bottles and beverage mugs; explain the environmental benefits; and establish incentives to encourage the use of reusables in place of disposables.
- Require all campus catered, athletic and other events to be Zero Waste events, from inputs to outputs, and be handled as such. Any event utilizing campus catering will automatically include Zero Waste services, provided by campus catering as a routine part of each campus catered event. Other non-catered, waived campus events are required to include adding a Zero Waste service to the event as part of the waiver.
- All campus and athletic events not catered by university catering/campus food services, are required to follow this policy and principles including reducing material production and consumption through source reduction practices mentioned in this policy.
- Outside food vendors are required to be alerted to this policy and to adhere to this policy in any dealings with University related events.
- Ensure all campus food service areas, including campus catering and athletic events are Zero Waste events favoring inputs that can be reduced (such as bulk over individually packaged condiments) and outputs that are recoverable in the Zero Waste system provided through campus catering and other outside caterers as well as conference, event coordination.
- Educate new University employees and students about the University's materials management and Zero Waste practices. Include this information with all new employee and student orientation events.

## **REUSE AND REPAIR**

Extending the life or usefulness of supplies, furnishings, equipment, and other goods via reuse is preferable to recycling or disposing of those items and materials. The University of XXXX encourages the following reuse approaches:

- Purchase durable, repairable, and/or reusable goods in place of disposable goods, when possible.
- Establish incentives and pricing structures for utilizing durables with all campus catered and waived events that include food.
- Ensure that unneeded but reusable supplies, equipment, electronics, and furniture are made available to other University units, local non-profits and/or State agencies through established means and programs.
- Provide reuse/exchange opportunities within university departments and for campus wide distribution such as: reusable office supply exchanges, surplus furniture, electronics and other reuse programs for use by campus community.
- Provide intra-campus communication opportunities for departments to post items for campus purchase prior to placing in any campus reuse exchange including surplus property.
- Encourage establishment of centralized department and/or building reuse exchange areas for reusable office supplies and furniture.
- Utilize items to the fullest extent of their useful life before purchasing replacements, encourage repair of usable equipment.
- Establish an inventory and storage location for extra materials generated from campus re-models and new construction to be available for building repairs.



## ESTABLISH CAMPUS ZERO WASTE MANAGEMENT SYSTEM

Creating a culture of Zero Waste is vital to success of this policy. Establishing a campus Zero Waste management system is critical to achieving goals of materials management and a Zero Waste campus (See page 10). The system should be complete in managing recycling, composting, reuse opportunities (ROSE-reusable office supply exchanges), surplus management, and other discards. Incorporate a Zero Waste and Materials Management system into the daily operations and business practices in all aspects of routine procedures and public involvement.

To create a comprehensive system, it's important to involve all responsible parties in the design, implementation and execution of the system which includes the placement and service of any materials discard receptacles based upon the following strategies:

- Include zero waste practices in all campus construction projects such as: waste reduction in deconstruction, zero waste practices to reduce construction waste and implementation of zero waste systems in completed construction projects (see page 31 for standards)
- Educate all administration, staff and students (starting with new employee orientation and student Introduction) on how the materials management and Zero Waste system works at the university including: purchasing, Zero Waste resources available for reuse, surplus, handling of confidential materials, handling of special/oddball wastes and any other waste reduction information.
- Provide mandatory department trainings for updates on Zero Waste procedures; what to do when purging an office; handling office materials such as toner cartridges; office supplies and other materials that are non-routine.
- Establish the university expectation of materials management and Zero Waste, with all campus community, through an annual letter to campus from the University President.



# ZERO WASTE SYSTEM



Zero Waste Deskside











## CREATING A MATERIALS MANAGEMENT CULTURE THROUGH CAMPUS ZERO WASTE INFRASTRUCTURE

Create a culture of Zero Waste including integrating all parts of waste management into a system instead of separating waste functions from Zero Waste efforts such as:

- Ideally, create an internal organizational structure called Materials Management to encompass Purchasing/Contracts, with discard management. Evaluate potential to create "Zero Waste Teams" that handle all recycling, composting and waste generated throughout campus buildings while centralizing entire waste function to the Campus Zero Waste Program and Environmental Health and Safety (for hazardous materials).
- Integrate Zero Waste (recycling, waste diversion, composting), campus waste collection services (traditionally custodians?), solid waste collection, "garbage" truck/dumpsters, surplus properties and reusable office supply into one unit entitled "Campus Zero Waste Program". House it in Campus Operations within the Materials Management (or Purchasing/Contracts) Department.
- Ensure industrial recycling of all industrial waste produced on campus such as: wood, vehicle batteries, scrap metal, wire recycling, concrete, tires and any other items that have a potential local market.
- Purchase what is needed, avoid over-purchasing; reduce waste produced from campus purchases through purchasing items with reduced packaging and reduced or eliminated waste generated from service contracts; utilize contracting to reduce waste and recovery by creating vendor responsibility for waste production.
- Coordinate efforts with Environmental Health and Safety to reduce the amount of hazardous materials purchased and stored on campus; integrate non-toxic alternatives into all campus practices including custodial, research and lab functions.
- Utilize green cleaning and green chemistry materials and strategies in all campus operations and research.
- Eliminate all stand-alone waste receptacles in all campus locations (interior, exterior, and in all athletic and housing facilities).
- Eliminate all waste receptacles in all classrooms.
- Eliminate large desk side waste receptacles. Replace with Zero Waste desk side system. Provide each office with desk side recycling and composting containers with a side car or mini-trash bin.
- Establish aesthetically pleasing, easy to identify, central Zero Waste stations throughout campus and available to a minimum of 10 people per department space, in all public areas. Each station should have paper and GMP containers, a small waste receptacle and compost(ables) collection opportunities.
- Ensure waste diversion opportunities in all campus areas including mail rooms, copy rooms, break rooms and department kitchens.

- Encourage each department to have a reusable office supply exchange area.
- Ensure each Housing resident in the residence halls and family housing, have in room/ unit recycling and compost(ables) collection containers and access to recycling and composting at all central waste stations located on-site.
- Eliminate desk side collection of waste, recycling and compost(ables), by establishing an individual responsibility to re-locate office materials to central Zero Waste stations for all campus units.
- Reduce size of all campus waste receptacles, favor Zero Waste principles (recycling and composting) over waste generation.
- Institutionalize Zero Waste services with all campus catered events, any campus events with food and all athletic events. Ensure these services are included as part of event as opposed to an extra non-essential service offered externally. Ensure that waste receptacle (garbage can) is the smallest bin in the set of collection containers.
- Favor practices that eliminate waste production. Create incentives and default to utilizing durables for all campus catered and food related activities where possible.
- Ensure that all inputs to waste system meet EPP standards. Require all campus food service inputs to be compostable or recyclable and compatible with materials processing. Require all compostable inputs to be approved by the Campus Zero Waste Program to ensure compatibility with materials processing systems.
- Require all campus meetings, conferences, events, whether catered or not, to be sustainable events including: incorporating Zero Waste practices and collection, minimization of print materials distribution, ensure all print materials follow University Recycled Paper Policy for type of paper utilized and to default to all double-sided copies, among other sustainability principles.
- Establish procedures and collection opportunities in Housing areas and on campus, for proper disposal and collection of special wastes for students.
- Issue all new students and employees with reusable tools-refillable water bottles, refillable beverage cups, reusable shopping bags.
- Ensure campus construction projects and campus facilities are in compliance with these principles.
- Continue to follow University of XXXX policies related to EPP, Materials Management, Zero Waste and sustainability.



## **MAINTENANCE AND OPERATIONS**

As college campuses provide trades maintenance, upkeep and service to campus grounds and facilities (including academic, residential and athletic), the University of XXXX will employ Zero Waste strategies in carrying out these vital campus duties:

- Building cleaning and maintenance will be conducted in accordance with environmentally sustainable practices. These practices include:
  - Reducing the use of chemicals used in cleaning and maintenance/service to the extent practicable.
  - Using environmentally preferable "green" cleaning and other building maintenance/service chemicals (such as adhesives, finishes, paint, etc...).
  - Eliminating desk-side collection of waste and recycling by Custodial or Zero Waste Program staff in favor of self-servicing by occupants of these containers/ materials to centralized Zero Waste collection locations (making waste receptacles the smallest container at the location). If necessary, utilize low density plastic bags for waste collection, recycling and other tasks as needed. This will save money and reduce resource consumption.
- Use of energy saving items and Energy Star® equipment for campus trades services (construction, plumbing, electrical etc..) and daily operations. Ensure all equipment in offices are Energy Star® rated including: light fixtures, computers, and appliances.
- Ensure replacement items and construction equipment minimize energy production such as: using energy saving light bulbs in all campus exit lights, overhead lights and office lights with options for responsible recovery (such as re-lamping programs and CFL recycling); utilize energy saving equipment such as any power tools, floor polisher etc...
- Storing overstock usable materials and chemicals for future use and/or disposing of these in an safe manner through recycling or hazardous materials handling.



## **DURABLE GOODS/ELECTRONICS**

Examples include, but are not limited to, food ware, office equipment (computers, monitors, copiers, printers, scanners, fax machines, flat screen televisions or displays), appliances (refrigerators, dishwashers, and water coolers), external power adapters, televisions, phones and other audio-visual equipment.

- Require building occupants to recycle electronics including: office equipment and appliances via established procedures through University Property Management.
- The building management team will provide building occupants with centralized durables collection containers in building storage rooms to manage building durable goods and electronics for reuse and/or recycling. If unavailable, identify alternate space.
- Communicate to all building occupants on University Property Management handling rules including location of online forms and campus contacts.
- Communicate dates, times and special collection opportunities to the occupants in order to maximize the success of the program.
- Purchase and utilize durable food ware as much as possible. Create pricing structure for catered events that favor use of durables in lieu of disposables or compostables.
- Create pricing structures in campus food services that favor refillable and reusable beverage containers and food ware.



# STUDENT COLLECTION MATERIAL DIVERSION ROUND-UPS

As a university is similar to a small city, consideration for materials generated in student housing areas is a vital component in campus materials management and Zero Waste practices. With students occupying campus living facilities and impacting the university waste stream, this policy also applies to all university owned living facilities.

Additionally, with a diverse campus population that includes students without personal transportation and international students who are unfamiliar with local resources, part of a Zero Waste campus includes providing opportunities for all students to divert personal items such as: electronics (i.e. computers, printers, scanners, stereos, televisions, etc..), cell and smart phones, textiles, household goods, appliances (microwaves, in-room refrigerators), furniture and other items that students bring to campus owned facilities that often get abandoned and landfilled into the university waste stream.

The University has an impact beyond the campus area from University students living in the nearby and local community. Thus, the university has an opportunity for community-campus partnership in providing opportunities for students to divert reusable items at the end of the year instead of negatively impacting the local neighborhoods with waste from end of the year move-outs.

The University will provide the following collection opportunities for on-campus and university owned off campus housing areas:

 Quarterly reusable collections for electronics, clothing, appliances and any other personal reusable items (generated by students). Utilize extensive communication efforts to ensure these are widely publicized and students come to expect quarterly opportunities to divert reusables and electronics from the landfill. Work to establish year round opportunities for reuse collection and textile collections regardless of condition. Work with local thrift industry to determine what are acceptable materials.





- End of year move-out effort to capture as much material as possible and ensure that electronics, durables, appliances and clothing are diverted from the landfill.
- Issue all new students living in University facilities individual room recycling collection bins with refillable beverage containers and water bottles. Minimize size of waste container as a sidecar to the in room bin.
- Establish central Zero Waste stations to include opportunities for recycling of paper, cardboard, glass/metal/plastic and compostable items.
- Provide each resident with information in new student orientation regarding Zero Waste system and information on how to properly dispose of all materials generated in student living facilities as mentioned above.
- Provide information about move-in and move-out procedures to include proper recycling, composting and durables handling.
- Establish reusable collections for 2 weeks at the end of the academic year in all campus owned living areas. Encourage student yard sales and maximize donation opportunities for durables and textiles.
- At the end of Spring Term, provide each living unit with color coded bags for reusable and recyclable collection that can be easily brought to a Zero Waste station and reusable collection locations.
- Provide regular round-up events for electronics and household hazardous waste at all campus owned living facilities.

## FACILITY ALTERATIONS AND NEW CONSTRUCTION

Examples include, but are not limited to: building components and structures (wall studs, insulation, doors, windows); panels; attached finishing (drywall, trim, ceiling panels); carpet and other flooring material; furniture; file cabinets; adhesives and sealants; paints and coatings; mechanical, electrical, and plumbing equipment.

As with LEED certification requirements: <u>https://new.usgbc.org/leed</u>, all materials need to be evaluated for sustainability standards, all campuses have specifications for campus construction that include deconstruction, material use and discard management systems and equipment. Campus construction standards provide an opportunity to include waste reduction practices such as: providing water refill stations, eliminating paper towels, installing hand dryers and implementing zero waste systems in buildings.

Example-University of Oregon Zero Waste Campus Construction Standards: <u>https://cpfm.uore-gon.edu/zerowaste-resources</u>

Specifically for Zero Waste practices, for all campus re-model and new construction, the University is required to evaluate items for reuse and donation opportunities prior to disposal, reducing the amount of materials thrown in the waste stream and maximizing reuse and resource conservation efforts as follows:

- Working with contractors, the university project managers will work with projects to identify, inventory and store (preferably in the existing building) extra materials that can be utilized for repair and/or future replacement of existing building components, fixtures, equipment etc...
- Through project contract specifications, contractors hired to perform work at the building will be required to recycle, donate and/or store for reuse: building components and structures (wall studs, insulation, doors, windows); panels; attached finishing (drywall, trim, ceiling panels); carpet and other flooring material; mechanical, electrical, and plumbing materials; furniture; file cabinets; adhesives and sealants; paints and coatings.
- All campus construction projects will make provisions for construction waste management by supplying centralized recycling containers for sorting on the construction site or specifying material recovery of all waste generated during demolition and construction





including the requirement for reporting waste diversion efforts, tonnages and how the materials were diverted (i.e. all wood scraps went to XX local wood product processor).

- All project on-site administrative locations will be provided with a full in-office Zero Waste collection system to be serviced by Campus Zero Waste Program staff.
- The building management team will work with the Campus Operations Capital Construction Team to establish building construction guidelines for tenant improvements that mandate construction waste management.
- All projects will include the documentation and tracking of building and tenant construction recycling, pre and post project, to identify areas for increased recycling and to document all waste related activities.
- Ensure all new construction and re-modeling includes plans for centralized Zero Waste stations (to include: paper, glass/metal/plastic, composting and landfill) either pre-fabricated equipment or built-ins, and signage as per the Campus Zero Waste Program specs.
- Consider incorporating a central departmental/building reusable office supply location to exchange supplies and reduce departmental costs.
- Ensure that all new office, classroom and meeting space, have an integrated waste management collection system such as a small desk side bin that is suited to collecting paper, glass, metal, plastic and possibly composting with a small mini bin for garbage.
- Ensure all replacement and new drinking fountains would contain a bottle refill option.
- Favor building projects that remodel over new construction to reduce costs, save energy and preserve valuable resources.
- In upgrading equipment and furnishings (i.e. carpeting, bedding, gym lockers, curtains), check for campus surplus opportunities for re-furnishing an area and then recycle, donate, reuse, or store for reuse as the preferred option.

## COMMUNICATION, EDUCATION, PROMOTION

Communication, education, promotion, daily operating instructions and campus expectations – are cornerstones of a successful Campus Zero Waste Program. This is especially true for building "occupants," those who are in the building as employees (faculty, staff, student workers, etc.) and whose work day revolves around the physical infrastructure and activities in the building. These building occupants should be well-educated regarding the Zero Waste procedures, facilities operations and practices. This includes orientation programs for new employees, campus contractors and students. Effective communication includes:

- Information on campus materials management and Zero Waste practices to be included in all campus orientation programs for new employees, students and contractors
- Maintenance of complete and accurate email lists of all building occupants and building managers
- Designating department contacts to serve on a campus list serve where the materials management and Zero Waste program, can communicate and educate on proper procedures and updates
- Use of communicative media and staff meetings to convey important Zero Waste procedures, instructions, and resources to building occupants
- Encouragement of feedback from building occupants regarding Zero Waste questions, needs, opportunities, ideas, and suggestions
- Implementation of a regular campus wide education/promotion/outreach effort on materials management and Zero Waste including: tabling, competitions, newsletter, webpage, Facebook page, twitter, Earth Day/America Recycles Day events, and reuse workshops

Similarly, building staff should be alerted to the needs of those building users who are not occupants – the students, faculty, professionals, and visitors who may attend or teach classes in or visit the building on a daily basis. These people may experience problems related to signage, receptacle placement, material preparation and sorting, etc. – or they may just express an interest in learning more about the University's Zero Waste efforts. If and when problems, needs, or opportunities are identified along these lines, feedback should be sought and conveyed to the appropriate personnel.

Building staff are encouraged to assist in ensuring a successful and effective Zero Waste program by:

- Assessing the Zero Waste infrastructure and procedures as they relate to building visitors and users
- Assisting visitors and users, as needed, to help them engage in Zero Waste behaviors
- Providing feedback on Zero Waste efforts and infrastructure to building staff, managers, and the Campus Zero Waste Program

- Instruct and educate occupants about self-servicing of desk-side units to centralized recycling and waste receptacles
- Provide building users with contacts and procedures for recycling/composting items which are not routinely collected in centralized receptacles (e.g. corrugated cardboard, toner and printer cartridges, Styrofoam, non-food and non-beverage metals and plastics, e-media, etc.)
- Provide building users with information on proper handling of confidential materials
- Provide building users with procedures for recycling items with special disposal requirements (e.g. batteries, fluorescent lights, etc.)
- Educate building occupants about voluntary composting opportunities and encourage participation in same



## PRIORITIZING DISPOSAL OPTIONS FOR LEFTOVER WASTE MATERIALS

It is important to recognize that there is a path toward Zero Waste and the results are not immediate; new procedures take time to implement, it takes time to foster a culture of Zero Waste among the various campus users, and some products may not yet have Zero Waste consistent alternatives. Therefore, as the University approaches the goal of Zero Waste, there will be a portion of residuals that must be discarded through a non-preferred option. There will be tough decisions to make regarding the most environmentally responsible alternative recovery or disposal pathway for those remaining residuals.

Once every available effort has been made to eliminate waste through the prioritized approaches in the Zero Waste Hierarchy (reducing, reusing and recycling), the University will evaluate which residual materials are left and identify the best available recovery/disposal options for those materials. Some options (new technologies or processes) may provide temporary solutions for mixed materials and some will require evaluation for individual material types. EPA performed a study of current waste conversion technologies called "State of Practice for Emerging Waste Conversion Technologies." The study includes technology descriptions, case studies of existing facilities and life-cycle analysis (LCA) of each of the technologies. The following list describes technologies that are currently available, as well as some of their benefits and limitations according to their current development. Future innovation may improve the performance of these existing technologies, as well as introduce new technologies.

\*\*Of note: though there are challenges and limitations already mentioned, some of these technologies are being questioned as to economic viability. The most important thing to note is that maximizing zero waste strategies and practices is truly the best choice for the environment and economy. More research and investigation is necessary to make further determinations on technology viability.



## MANAGING UNRECOVERABLE MATERIALS

It is important to note that because of rapid technological development, any prioritized list of residual disposal methods could quickly become out of date. Therefore, the University must once again return to the following list of questions and apply them to the residuals in order to identify the most beneficial, least impactful disposal option:

- What is the waste material?
- Is there a higher or better value (environmental and financial) use for the material?
- What are the barriers that keep the material from going to that higher-value market?
- Is that market permanent, or ad hoc/volatile?
- What are the locally available recovery options?
- What are the inputs and outputs of the recovery options, including waste material (feedstock), water, energy, air and water emissions, toxins, greenhouse gases, products, etc.?
- If the recovery option produces a product, what does that product replace in the market, and what are the impacts of producing this product from virgin materials?
- Is the product regulated? If so, is the recovery option's technology certified for sale domestically or internationally?
- Are any of the outputs hazardous or toxic? If so, do those outputs result from the waste feedstock? What controls are used to remove hazards or toxics from the products and how are the hazards or toxics handled? Does the waste disposal option result in a smaller amount (measured by volume, weight, etc.) of hazardous material than the input waste feedstock?

By answering these questions and choosing the lowest impact option, the University will be better equipped to identify a transitional waste disposal option for residuals that aligns with the goals of Zero Waste as the program is implemented.



## ANAEROBIC DIGESTION

Anaerobic Digestion (AD) is a "biochemical conversion process that decomposes organic material in the absence of oxygen."<sup>1</sup> Organic materials in the waste stream include food waste, agricultural waste, manure, landscape trimmings, etc. The main products from AD include biogas (composed primarily of methane and carbon dioxide) and digestate. The biogas can be combusted to generate heat and electricity or upgraded (to remove carbon dioxide) to create either natural gas for the pipeline or bio-compressed natural gas (bio-CNG) to fuel vehicles. The digestate can be composted, using traditional composting methods, to produce nutrient rich compost. AD is divided into "wet" and "dry" technologies. Wet AD is typically co-located with wastewater treatment and process feedstocks with a solid content of less than 15%. Dry AD processes feedstocks with a solids content above 15%. Although dry AD is a relatively new technology in the United States and only a few commercial facilities exist, there are many more operating facilities in Europe.

Where facilities exist, AD would replace composting in the prioritization of recovery methods. AD is the same biodegradation process that takes place at landfills that produces landfill gas, but is much more efficient at capturing the resulting biogas. At landfills, the organics begin decomposing before the cap is placed, and for decades after. With AD, that gas is captured within the closed system.

**Benefits:** AD produces the same compost as traditional composting, and also produces high-value biogas that can offset fossil fuel use. The same rules that apply to compost apply to AD, contaminated input leads to contaminated output. In the case of contaminated materials, the digestate would have to be landfilled and not composted. However, with an AD system in place, even if the organic material inputs are contaminated, material can be processed in the system to capture the methane.

**Limitations:** For maximum biogas production and a healthy biological process, AD requires relatively large quantities (10-100 tons per day) of organics of balanced material content. An AD system cannot work on one type of organic material alone. However, it is important to note that many organics in the waste stream are not due to wasteful use, but are the result of natural processes, such as agricultural waste.

## GASIFICATION

Gasification is the "partial oxidation of carbon-based feedstock to generate syngas. The process is similar to pyrolysis, except that oxygen (as air, concentrated oxygen, or steam) is added to maintain a reducing atmosphere, where the quantity of oxygen available is less than the stoichiometric ratio for complete combustion."<sup>2</sup> There are currently three types of gasification for MSW: high temperature, low temperature and plasma. Gasification produces syngas (primarily carbon monoxide, hydrogen, and sometimes methane), which can be used for heat, power, fuels, fertilizers or chemical products and may produce char, inert slag, brine, bio-oils and steam. The residual char and slag may require landfilling.

1 "State of Practice for Emerging Waste Conversion Technologies." EPA, October 2012; p. 54. Accessed online at <a href="http://nepis.epa.gov/Adobe/PDF/P100FBUS.pdf">http://nepis.epa.gov/Adobe/PDF/P100FBUS.pdf</a>>

2 "State of Practice for Emerging Waste Conversion Technologies." EPA, October 2012; p. 34. Accessed online at <a href="http://nepis.epa.gov/Adobe/PDF/P100FBUS.pdf">http://nepis.epa.gov/Adobe/PDF/P100FBUS.pdf</a>>

**Benefits:** Gasification should only use feedstocks that have been rejected by reuse and recycling recovery options. Material recovery can be up to 82% efficient. The syngas produced replaces electricity generation. A gasification facility must provide a net greenhouse gas reduction and fewer contaminants and toxins over the marginal electricity generation in order to be considered beneficial.

**Limitations:** If a facility cannot prove that its process produces fewer greenhouse gases, contaminants and toxins than marginal electricity generation, it should not be considered as an option. Gasification facilities currently require large quantities (75-330 tons per day) of residuals as feedstocks, which may not align with the Zero Waste reduction goals.

## **INCINERATION: WASTE TO ENERGY**

Incineration involves the use of a furnace or container for burning mixed waste materials. Incinerators produce electric power. Incineration is considered a lowest value option and must be evaluated carefully to determine if it provides a better disposal option than landfilling. EPA finalized new rules for improving the controls on incinerators in 2012. The rules can be found online at <u>https://www.epa.gov/boilers</u>.

**Benefits:** The process reduces the weight of the input material by approximately 75% and the volume by approximately 90%. The electricity generated offsets the need for other electricity generation. Incineration should only be considered when the facility can demonstrate a net reduction in greenhouse gas, local air emissions, contaminant and toxicity over landfill and other electricity production.

**Limitations:** Incinerators require significant additional energy use to fully combust waste materials. The amount of energy recovered by incinerators tends to be much lower than the conversion technologies listed above. Even with the best available technology controls, incinerators release significant amounts of greenhouse gases, local air emissions, contaminants and toxics. Incinerators are also very expensive and require large quantities of waste feedstock to operate, which may not align with the Zero Waste reduction goals.



## LANDFILLING

Landfilling is considered a lowest value disposal option. Whenever the choice is available, landfills that have advanced to capturing methane are preferable to those without.

Benefits: Landfills require relatively few inputs to maintain and, with the proper controls, can

contain waste residuals in a closed environment and prevent leakage into the surrounding water and soils. For waste residuals that have no other reuse, recovery or diversion option, landfills provide a place to deposit waste and prevent it from being disposed of in the open environment. Best management practices for hazardous waste disposal is typically landfill in a permitted facility. Hazardous waste materials should be properly treated and disposed of according to EPA standards.

**Limitations:** Landfills bury our waste residuals and postpone today's waste problem for future generations. There have been discussions about mining landfills, though not something that is currently occurring in the US, garbage picking is a way of life in many impoverished countries.

## PYROLYSIS

Pyrolysis involves the "use of heat to thermally decompose carbon-based material in the absence of oxygen."<sup>3</sup> The products from pyrolysis depend on the specific technology, but tend to be a mixture of gaseous products, liquid products and char. The gaseous products can include an energy-rich syngas that can be used to produce electricity, and process gasses that can be flared. Liquid products are typically a form of synthetic oils, such as crude oil and waxes. The solid residuals contain char and any metals or other contaminants that were on the feedstock. The technology can typically be deployed in one of three process categories: Thermal, catalytic or hydrocracking. Thermal pyrolysis generally heats mixed plastic feedstock to temperatures above 350 degrees Celsius to produce liquid crude oil product. Catalytic pyrolysis uses a catalyst, to reduce the reaction temperature and time, to process plastic feedstocks and produce liquid and gas products. Hydrocracking involves a reaction with hydrogen and a catalyst at low temperatures (150-400 degrees Celsius), generally using mixed waste products (including MSW plastics, plastics mixed with coal, scrap tires, etc.) to produce gasoline fuels. The residual char may be used as an input into another industrial process, or may require landfilling.

**Benefits:** Pyrolysis should only use feedstocks that have been rejected by reuse and recycling recovery options. These plastics have high energy content and pyrolysis can typically recover up to 85% of the material into a usable product. It is important to note that this product replaces virgin fossil fuel extraction. A pyrolysis facility must provide a net greenhouse gas reduction and fewer contaminants and toxins over virgin resource extraction in order to be considered beneficial.

**Limitations:** If a facility cannot prove that its process produces fewer greenhouse gases, contaminants and toxins than virgin resource extraction, it should not be considered as an option. Many technologies also require a minimum quantity that may be above the community's residual waste generation. In order to not conflict with Zero Waste goals, a facility's minimum quantity requirements should be within the quantity of unrecoverable residuals (Zero Waste goal is less than 10%).

## ZERO WASTE TO LANDFILL

This term has been used as a greenwashing tool since landfilling has become an unpopular practice especially since it is an eyesore in communities. Zero Waste to landfill implies that the

<sup>3 &</sup>quot;State of Practice for Emerging Waste Conversion Technologies." EPA, October 2012; p. 19. Accessed online at <a href="http://nepis.epa.gov/Adobe/PDF/P100FBUS.pdf">http://nepis.epa.gov/Adobe/PDF/P100FBUS.pdf</a>>

materials will be sent to other systems (such as Waste to Energy, Gasification etc...) in place of landfilling. This practice is not zero waste.

### WASTE AUDITS

Performing waste audits and waste sampling is an important method/tool to determine what materials are ending up in the dumpster which in turn provides an opportunity to evaluate and improve existing collection and education, as well as assist in determining a market opportunity. Waste sampling, garbage watch (doing visual observations of dumpster collections) and waste auditing can be done as a simple process or an extensive process. This can provide the hard data to use to demonstrate the need for a Campus Zero Waste Program.

Doing periodic waste audits can be helpful in keeping the program on the pulse of how campus is doing and also can assist in keeping on par with new materials or practices that are creating waste or resource recovery opportunities as well as creating an opportunity to monitor existing materials. Waste streams change and waste auditing is a valuable tool to keep the program in check. Additionally, waste audits are an excellent educational tool that can be done in a public space which can allow the campus community to participate and gain a better understanding of why it is important to participate in the campus Zero Waste effort.

For more information, go to: https://cpfm.uoregon.edu/zerowaste-resources



## TRACKING

Tracking the waste stream is a vital part of a campus Zero Waste program. A simple data spreadsheet is an easy way to do this. Collect and track campus receipts for all materials that are recovered, diverted and landfilled. Enter data into a spreadsheet to ultimately create a diversion rate (% diverted divided by total materials generated including waste).

There are tracking systems that can be purchased and developed that could further document greenhouse gas reduction, source reduction and other metrics as needed. Tracking is the most powerful tool to provide longevity for a campus Zero Waste effort. The EPA has created a conversion mechanism to convert unweighable items into tracking weights.

RecycleMania is an intercollegiate competition that is held annually that requires tracking of the campus waste stream. Participating in RecycleMania is a great strategy to start, augment and improve any collegiate Zero Waste effort. RecycleMania also provides an opportunity for schools to be compared as the data is current and available on the website:

#### http://www.recyclemaniacs.org/

RecycleMania also holds webinars and forums to assist in tracking for the RM competition. Many schools have utilized this competition to kick off Zero Waste efforts on their campuses.



Receiving recognition for Zero Waste efforts is another important strategy in garnering support for a campus Zero Waste effort. Take advantage of university, city, state, local and national award opportunities. Participating in state recycling organizations and other Zero Waste organizations are vital to assist in program trouble-shooting as well as provide an opportunity to receive recognition. Likewise, there are several prestigious award opportunities to gain recognition for your school. The EPA, American Forest and Paper Association, and the Association for the Advancement of Sustainability in Higher Education are just a few of the places where your school can apply for and gain recognition. This allows an opportunity for great outreach and media attention.

Gaining recognition through the media is an opportunity for free promotion of a school's efforts. Share challenges and successes including educational events, with the media, both local and beyond. This is a great way to support the campus, educate the community and provide kudos to the school. Work with the school media department as they love to promote positive efforts being made on campus.

## ZERO WASTE CERTIFICATIONS

There is an increase in awareness and work on global Zero Waste initiatives. Currently, there is a lot of work being done to create a Zero Waste certification process that will be applicable on college campuses. Stay tuned and keep your eye on the pulse of Zero Waste. Gaining Zero Waste certification is another valuable tool that will help move waste management practices towards Zero Waste. Campuses are also implementing Green Office Certifications that are complementing campus Zero Waste certifications. See resources section.

## NETWORKING

Networking, participating in local committees, joining a listserv and participating in a peer industry organization are vital in being a Zero Waste campus. The better other schools are doing, the better you are doing, especially rival schools! This toolkit was a cooperative effort of the College and University Recycling Coalition, the premier organization for Collegiate Zero Waste Programs. There is a free listserv, regional conferences and great resources available through CURC. With CURC as a hub, there are endless resources and support available to help build your Zero Waste campus.

And don't forget to say:

## THANKS FOR THINKING ZERO WASTE!



## RESOURCES

\*If a link is not working search by the subject and category of the resource.\*

### Award Programs

- Association for the Advancement of Sustainability in Higher Education(AASHE) www.aashe.org
- AF&PA <u>http://www.paperrecycles.org/</u>
- EPA Wastewise <u>https://www.epa.gov/smm/wastewise#awards</u>
- National Association of College and University Food Services (NACUFS) <u>http://www.nacufs.org/sustainability-awards</u>
- Solid Waste Association of North America (SWANA) <u>https://swana.org/Awards.aspx</u>
- Your state recycling organization typically gives annual awards. See "organizations" for a link to a list of state recycling associations.

#### **Best Collegiate Practices and Sample Policies**

- American University's Zero Waste page and Zero Waste Policy <u>http://www.american.edu/finance/sustainability/Waste.cfm</u>
- Appalachian State University's Waste Reduction Strategic Plan <u>https://sustain.appstate.edu/initiatives/zerowaste/</u>
- Pennsylvania State University's "Live, Learn, Lead" campaign <u>http://sustainability.psu.edu/</u>
- University of Oregon Zero Waste Campus Construction Standards <u>https://cpfm.uoregon.edu/zerowaste-resources</u>
- University of Oregon Zero Waste Program <u>https://cpfm.uoregon.edu/zerowaste</u>

# Think Before You Drink FO REFILLABLE

#### Calculators Related to Solid Waste and GHG Tracking

- EPA's EPP (Environmentally Preferable Purchasing) page. This page has information on determining EPP options and links to EPP calculators. <u>http://www.epa.gov/epp/</u>
- EPA's WARM model for determining GHG emissions from waste stream <u>https://www.epa.gov/warm</u>
- Life Cycle Assessment (LCA) information page. This website by the EPA has information about life cycle assessments and how to conduct them. <u>https://www.epa.gov/saferchoice/design-environment-life-cycle-assessments</u>

#### **Conferences and Training**

- AASHE Annual Conference <u>http://conference.aashe.org/</u>
- BioCycle conferences <u>http://www.biocycle.net/conferences/about-biocycle-conferences/</u>
- Collegiate Sports Sustainability Summit <u>https://nirsa.net/nirsa/institutes/</u>
- CURC Regional Conferences and webinars <u>www.curc3r.org</u>
- Greenbuild International Conference and Expo <u>http://www.greenbuildexpo.com/</u>
- Recycling 101, an on-line course from Oregon State University <u>https://pace.oregonstate.edu/catalog/free-recycling-101-course</u>
- Resource Recycling Conference <u>http://rrconference.com/</u>
- Smart and Sustainable Campuses Conference. <u>https://smartandsustainable.umd.edu/</u>
- Solid Waste Association of North America (SWANA) <u>https://swana.org/Events.aspx</u>
- > State recycling organizations hold annual conferences
- West Coast Climate and Materials Management Forum <u>http://westcoastclimateforum.com/</u>
- Zero Waste Week <u>http://ncrarecycles.org/?s=zero+waste+week</u>

## STOP CLIMATE CHANGE THINK ZERO WASTE

YOU can be the difference DO SOMETHING. DO ANYTHING.

- 1. REDUCE, REUSE, RECYCLE, COMPOST
- 2. USE REFILLABLE MUGS, WATER BOTTLES, BAG
- 3. RIDE A BIKE, RIDE A BUS, WALK
- **4. USE ENERGY EFFICIENT LIGHTBULBS**
- 5. EAT LOCAL, ORGANIC, VEGETARIAN
- 6. TURN IT OFF! EVERY WATT COUNTS
- 7. DONATE REUSABLE ITEMS
- **8. RECYCLE ELECTRONICS**



9. SHUT OFF WATER WHEN YOU BRUSH YOUR TEETH

**10. CHALLENGE YOURSELF TO CONSUME LESS** THINK GLOBAL, ACT LOCAL - VOTE!

#### **Events**

- > America Recycles Day (November 15<sup>th</sup>) http://americarecyclesday.org/
- Arbor Day (April 25<sup>th</sup>) https://www.arborday.org/index.cfm
- Buy Nothing Day (Day after Thanksgiving) http://en.wikipedia.org/wiki/Buy Nothing Day
- Campus Sustainability Day (October 23<sup>rd</sup>) http://campussustainabilitvdav.org/
- Earth Day (April 22<sup>nd</sup>) http://www.earthday.org/
- ➢ Earth Hour (March 29<sup>th</sup>) http://www.earthhour.org/
- Use Less Stuff Day (Thursday before Thanksgiving)
- Wikipedia's list of environmental dates https://en.wikipedia.org/wiki/List\_of\_environmental\_dates

#### Equipment

- Bag Connection http://www.bagitsystem.com/
- Busch Systems www.buschsystems.com
- Clean River Recycling Solutions http://www.cleanriver.com/
- ClearStream http://www.clearstreamrecycling.com
- Landmark Studio and Design http://www.landmarkstudio.com/
- ➢ Max-R http://www.max-r.net/
- Recycle Away http://www.recvcleawav.com/

Zero Waste

Higher Education

#### Facts Sheets, Case Studies and Reports

- Earth Resource Foundation: examples of businesses that have succeeded in diverting over 90% of their waste from landfills and incinerators. <u>http://www.oregon.gov/deq/mm/Pages/2050-Vision-Workgroup.aspx</u>
- Incineration Fact Sheet <u>http://www.energyjustice.net/files/incineration/trashincineration.pdf</u>
- Oregon Materials Management Vision 2050 <u>http://www.oregon.gov/deq/mm/Pages/2050-Vision-Workgroup.aspx</u>
- Stop Trashing The Climate" This report explains the relationship of waste and climate change. <u>https://ilsr.org/stop-trashing-the-climate/</u>
- "The Story of Capannori", a case study of a Zero Waste town in Italy. <u>http://www.zerowasteeurope.eu/wp-content/uploads/2013/09/ZWE-Best-practice-Capan-nori.pdf</u>
- Story of Stuff Project <u>http://storyofstuff.org/</u>
- Zero Waste Business Principles <u>http://zwia.org/standards/zw-business-principles/</u>
- "ZWstrategy in Europe explained-The main principles" Zero West Europe <u>http://www.zerowasteeurope.eu/2013/09/zw-strategy-in-europe-explained-the-main-principles/</u>



#### Implementing and Growing a Zero Waste Campus

- Institutional Recycling Network-Comprehensive recycling for businesses, education, and health. Material diversion clearinghouse-specializes in College waste challenges. <u>http://www.ir-network.com/</u>
- <u>Recycling and Beyond: A College Campus Primer</u>. By Christine von Kolnitz, Medical University of South Carolina and Karyn Kaplan, University of Oregon. <u>https://cpfm.uoregon.edu/zerowaste-resources</u>
- Zero Waste International Alliance. This website is a resource of Zero Waste principles and practices. http://zwia.org/

#### Listserves

- Green Schools <u>http://listserv.brown.edu/?A0=GRNSCH-L</u>
- GreenYes <u>http://greenyes.grrn.org/</u>
- Recyc-L <u>http://curc3r.org/resources/recyc-l-listserv</u>
- US Composting Council forum <u>http://compostingcouncil.org/online-forum/</u>



#### **Marketing Materials**

- Recycling and Beyond: A College Campus Primer <u>http://zerowaste.uoregon.edu/Book/index.htm#Chapter9</u>
- TerraCycle <u>http://www.terracycle.com/en-US/</u>

#### **Material Tracking Programs**

- EPA Wastewise <u>https://www.epa.gov/smm/wastewise</u>
- Keep America Beautiful <u>http://www.kab.org/site/PageServer?pagename=affiliate\_home</u>
- RE-TRAC <u>https://www.re-trac.com/</u>

#### **National Competitions**

- Electronics Challenge <u>https://www.epa.gov/fec/federal-electronics-challenge-program-overview</u>
- Game Day Challenge <u>http://gamedaychallenge.org/</u>
- Recycle Bowl <u>http://recycle-bowl.org/</u>
- RecycleMania
  www.recyclemaniacs.org
- US Food Waste Challenge <u>http://www.usda.gov/oce/foodwaste/index.htm</u>

# RECYCLE COMPOST

#### Organizations

- Lists of State Organizations
  - Fibrex list of recycling organizations <u>http://www.fibrexgroup.com/us-state-recycling-organizations</u>
  - Recycle.cc list of recycling and composting organizations <u>http://www.recycle.cc/assn.htm</u>
- National Organizations
  - Association for the Advancement of Sustainability in Higher Education (AASHE) www.aashe.org
  - Association of College and University Housing Officers International (ACUHO-I) <u>http://www.acuho-i.org/</u>
  - Association of Physical Plant Administrators (APPA). <u>https://www.appa.org/index.cfm</u>
  - College and University Recycle Coalition (CURC) toolkits, guides, regional conferences, networking, listserve <u>http://www.curc3r.org</u>
  - EPA Wastewise <u>https://www.epa.gov/smm/wastewise</u>
  - GrassRoots Recycling Network www.grrn.org
  - Keep America Beautiful (KAB) <u>http://www.kab.org/</u>
  - National Associations of College Stores (NACS) <u>http://www.nacs.org/</u>
  - National Association of College and University Business Officers (NACUBO) <u>http://www.nacubo.org</u>
  - National Association of Educational Procurement (NAEP) <u>http://www.naepnet.org</u>
  - National Association of State Procurment Officials (NASPO) <u>http://www.naspo.org/</u>
  - National Recycling Coalition <u>http://nrcrecycles.org/</u>
  - NFW Campus Ecology <u>http://www.nwf.org/Campus-Ecology.aspx</u>

- Solid Waste Association of North America (SWANA) 0 https://swana.org/
- University Surplus Property Association (USPA) http://www.universitysurplus.org/
- US Composting Council www.compostingcouncil.org
- US Green Building Council (USGBC) http://www.usgbc.org/
- Zero Waste International Alliance http://zwia.org/

#### **Sporting Venues and Zero Waste**

- Green Sports Alliance http://greensportsalliance.org/
- > Ohio State http://footprint.osu.edu/zero-waste-ohio-stadium/

http://www.ohiostatebuckeyes.com/facilities/zero-waste-ohio-stadium.html

If you're NOT for

ZERO WASTE

how much waste are you

for?

University of Colorado http://www.cubuffs.com/ViewArticle.dbml?ATCLID=1549812



## **STOP CLIMATE CHANGE: THINK ZERO WASTE**

#### **Toolkit Contacts**

- Good Company Sustainability Consultants <u>www.goodcompany.com</u>
- University of Oregon Zero Waste Program recycle@uoregon.edu

#### **Trade Journals**

- Biocycle <u>www.biocycle.net</u>
- Resource Recycling <u>http://www.resource-recycling.com/</u>
- Waste 360 <u>http://waste360.com/</u>

#### Zero Waste Campus Metric

Penn State's REDI index (response diversion index) <u>https://redi.opp.psu.edu/</u>

#### **Zero Waste Certifications**

- Green Office Certification <u>https://casit.uoregon.edu/news/green-office-certification</u>
- NRC (developing Zero Waste certifications) <u>www.nrcrecycles.org</u>
- U.S. Zero Waste Business Council (USZWBC) <u>http://www.uszwbc.org/</u>



