



# GUIDE TO COMPOSTING AT SPORTS VENUES

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## PREFACE

**A**lthough the amount of wastes produced globally each year is impossible to precisely measure, what we do know indicates that it is an enormous, unsustainable burden. U.S. EPA data indicate that the United States generates more than 12 billion tons of wastes each year from all sources, including mining wastes, coal ash, oil and gas industry wastes, agricultural waste, food wastes and food processing residues, medical wastes, municipal waste, nuclear wastes, incinerator ash, cement kiln ash, and other types of wastes.<sup>1</sup>

In the unlikely event that the United States accounts for fully one-third of all wastes produced on the planet, which is probably an over-estimate of the United States' contribution, then it is reasonable to estimate that global waste generation might total as much as 35 billion tons of wastes annually from all sources. That means that during the next 10 years as much as 350 billion tons of wastes will have to be managed globally. Where will it all go? How can it all be managed?

In nature, there is no waste. Detritus produced by one organism is biologically processed into a nutrient or other useful resource by other organisms. It is only humans who produce waste, and over the past century that waste stream has been growing in volume and has become increasingly synthetic, toxic, and difficult to reprocess into useful products. This needs to change. Indeed, the growing global waste proliferation problem is an ecological disaster in the making. Raw materials that have been laboriously collected and processed at great ecological cost are routinely discarded as "waste" after a very brief use.

Waste is a function of efficiency: The more efficient we are, the less waste we produce or leave behind for disposal. Sustainability requires that we model our production and waste generation systems on naturally occurring biological models, with efficiency, recycling, and reuse designed into products and operations.

Food waste, which, along with landscaping debris, is the subject of this Guide, is a particularly inefficient, ecologically troubling feature of American society. According to the U.S. EPA, "More food [waste] reaches landfills and incinerators than any other single material in municipal solid waste... In 2011 alone, more than 36 million tons of food waste was generated, with only four percent diverted from landfills and incinerators for composting."<sup>2</sup>

According to the U.S. Department of Agriculture, recovering just 5 percent of the food waste discarded annually in the United States could feed four million people each day. Recovering 25 percent of it could feed 20 million people each day.<sup>3</sup> The good news is that donations of uneaten serviceable food seem to be on the rise. For example, beginning in the fall

of 2010, all 30 National Hockey League Clubs committed to pack up prepared but unsold concession food on game nights for redistribution to local shelters and other social service centers. Through this effort, the NHL diverts approximately 100 tons of food waste from landfills each year, while providing more than 150,000 meals annually to hunger relief programs in hockey communities. According to estimates provided by the U.S. EPA, the NHL reduces approximately 79 metric tons of carbon dioxide equivalent (MTCO<sub>2</sub>E) from the environment each year through this initiative. The League has received praise for this program from the U.S. EPA, which presented the NHL with the America Recycles Day Award in 2011, and the Agency has individually honored 12 NHL Clubs with EPA Certificates of Achievement.<sup>4</sup>

Given their composition, food scraps and landscaping debris should not be sent to a landfill or to a waste combustor. However, of the 72 billion pounds of food waste produced each year in the United States, more than 95 percent of it winds up going to landfills and incinerators. Less than 5 percent of all food waste is recovered for composting.<sup>5</sup> In landfills, decomposing food waste and landscaping debris cause methane gas emissions. Methane is a greenhouse gas 34 times more potent than CO<sub>2</sub>, and landfills in the United States account for more than twenty percent, fully one-fifth, of all methane emissions generated from all sources.<sup>6,7</sup> Moreover, food waste and landscaping debris are high in moisture and are not particularly high in Btus, making them unsuitable for combustion. (Food waste typically contains only about 2,000 Btus/lb, and yard wastes contain about 2,800 Btus/lb, compared with 12,000 Btus/lb for plastics, 7,200 Btus/lb for paper, and 8,000 Btus/lb for wood.<sup>8</sup>) And food waste and landscaping debris are high in nitrogen,

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which is why they make good compost. However, when combusted, the nitrogen-rich food and yard wastes cause emissions of NO<sub>x</sub>, which contribute to smog, acid rain, and tropospheric ozone, a greenhouse gas.

This Guide has been produced to assist stadiums and arenas in increasing their diversion of food and yard wastes for beneficial use. It is premised on NRDC's fundamental waste management guideline which emphasizes that each category of waste has an ecologically optimal disposal route. Public policy and private investments, including operations at stadiums and arenas, should encourage the routing of materials found in the waste stream to their best use. So how should food and yard wastes be handled for better ecological results? As described in this Guide, there are two sound options: Food and yard wastes should be sent to an anaerobic digester to produce natural gas and soil amendments, or they should be aerobically composted.

Despite the enormous potential to recover food and yard wastes for composting or anaerobic digestion, and despite the ecological need to do so, the fact remains that tens of billions of pounds of these wastes are generated each year and only a tiny fraction is recovered for beneficial use. As this Guide makes clear, there are numerous reasons for this. Among the most influential barriers to ecologically sound food waste management is contamination by non-compostable plastic food packaging. While plastic packaging often provides many benefits, it would be hard to identify an industry that has been more irresponsible about the waste stream impacts of its products than the plastic packaging industry. Ninety-two percent of all plastics discarded in the United States are not recovered for recycling, while only 13 percent of plastics packaging is recovered for recycling.

Our oceans are being treated like a downstream sewer by the plastics packaging industry. And that industry is also the single most aggressive and self-interested political opponent stymying common sense laws that would ask the packaging industry to help share the costs needed to remedy our nation's underdeveloped plastics recycling infrastructure, laws that already exist in 47 countries as of this writing, including Canada and the European Union. As this Guide indicates, high volume anaerobic digestion and composting are dependent on a shift in the composition of plastics packaging and a commitment by both the private and public sectors to developing infrastructure that supports the development of those technologies. Hopefully the market influence of the sports industry, which is currently forced to waste millions of dollars annually because fossil fuel-derived plastics packaging is non-compostable and because municipal anaerobic digestion and composting technologies are so underdeveloped, will help shift public policies and private investments towards more responsible packaging design and organic waste management options.

This Guide deserves to be read widely throughout the sports industry, and will hopefully spur many venues to identify cost-competitive, ecologically superior ways to manage their organic waste stream, which is an urgent ecological need. This Guide is another technically informed ecological-management tool produced by NRDC's influential Sports Greening Project, which is focused on providing high quality assistance at no cost to stadiums and arenas seeking to enhance their environmental profile and, hopefully, reduce operating costs along the way. Building upon NRDC's hands-on greening collaborations with professional and collegiate teams and leagues, our EPA-Award winning NRDC Sports Greening Advisor, our influential Game Changer Reports, and the Solar Guide for Stadiums and Arenas (which NRDC produced in collaboration with the Bonneville Environmental Foundation and the Green Sports Alliance), this Guide to Composting at Sports Venues deserves widespread attention. Imagine the world 50 years from now if current trends continue. Now imagine the world 50 years from now if all food and yard wastes—indeed all wastes—were recovered for distribution to the needy, for reuse, for recycling, for anaerobic energy recovery, and for composting. When it comes to ecological stewardship, what we can do, we must do. The future is ours to build.

Allen Hershkowitz  
*Director, Sports Project*  
*Director, Solid Waste Project*  
Natural Resources Defense Council



# QUICK START GUIDE

RECOMMENDATIONS	ADDITIONAL INFORMATION
<b>1</b> PERFORM A WASTE AUDIT.	<p>Performing a waste audit is an effective way to learn more about the type of materials your organization generates as waste. During a waste audit, the auditor investigates the sources, composition, weight, volume, and destinations of the materials that your organization generates, most of which are likely to be recyclable or compostable.</p>
<b>2</b> CONDUCT AN INVENTORY OF EXISTING WASTE INFRASTRUCTURE.	<p>Evaluate how compostable items are currently managed. If you already collect compostables, evaluate how that collection is coordinated alongside recycling and garbage collection. Determine what infrastructure, resources, and staff time are currently devoted to waste management. Consider the available budget, infrastructure, staff time, and space available (in concourses, loading docks, etc.) for an expanded program.</p>
<b>3</b> IDENTIFY AN ORGANICS HAULER AND VERIFY ORGANICS COLLECTION REQUIREMENTS.	<p>Determine whether your existing waste hauler can handle your organic waste, or locate another hauler. Ask your hauler whether there are certain types of organics the company does not accept, whether there are requirements to put organic waste in special containers or leave them in a particular location, etc.</p>
<b>4</b> NEGOTIATE A COMPOSTING HAULING CONTRACT AND PLAN A COMPOSTING BUDGET ACCORDINGLY.	<p>Negotiate a composting hauling contract and integrate this into your overall waste budget. Ask your hauler to clearly break out the different costs in the contract, including hauling and landfill disposal fees.</p>
<b>5</b> MAP OUT ADDITIONAL COMPOSTING RECEPTACLE AND SIGNAGE NEEDS.	<p>We recommend co-locating recycling, compost, and garbage bins in all locations where feasible, and providing clear and consistent signs for each type of disposal. Brand all signs. Clearly and visibly identify acceptable items for all receptacles; it helps to use a combination of images and words.</p>
<b>6</b> WORK ON CONVERTING CONCESSION SERVICWARE TO COMPOSTABLE PRODUCTS AND TEST COMPOSTABLE SERVICWARE WITH YOUR COMPOST COMPANY.	<p>We recommend that all bioplastics be certified as compostable to ASTM 6400 standards, or ASTM 6868 standards for coated paper/board. Prioritize waste-based compostable packaging where feasible (e.g., bagasse or wheat/rice straw). Verify that any compostable serviceware you choose is compatible with your compost company's processes and specifications.</p>
<b>7</b> TRAIN CONCESSIONAIRES AND OTHER STAFF ON COMPOSTING PROCEDURES.	<p>Make sure all concessionaires and staff, including facilities, purchasing, food service, housekeeping, and security personnel, and security personnel, are trained about composting procedures, and solicit their ideas for implementation. For collection of back-of-house food waste, train all relevant staff on what they should separate for compost collection. Also train front-of-house staff in how to guide fans to use the correct waste receptacles.</p>
<b>8</b> MEASURE YOUR WASTE GENERATION/DISPOSAL.	<p>We recommend working with your hauler to gather recycling and waste data. Use your league's data tracking systems where available, consider tools such as EPA's WasteWise, and/or develop your own measurement system.</p>
<b>9</b> CONSIDER SPONSORSHIP.	<p>Investigate potential sponsors from waste, food, or other industries (including current vendors) that may be interested in aligning their brand with your composting initiatives. Involving sponsors and vendors may bring funding, infrastructure, products, and advertisements/publicity to your composting program.</p>
<b>10</b> EDUCATE AND INVOLVE FANS IN YOUR INITIATIVE.	<p>Informed participation by fans in your composting program is essential for its success. Through signs, announcements, volunteer opportunities, and social media, encourage fans to learn about and participate in your initiative.</p>

## INTRODUCTION

Composting is the controlled breakdown of organic waste (such as food waste and yard waste) into a product that can be beneficially used as mulch and fertilizer. Food waste, landscaping debris, and wood waste make up one-third or more of a region's municipal waste stream, depending on location, and organic materials (including food, landscaping waste, and some serviceware) typically constitute an even higher percentage of waste generated in stadiums and arenas. There are many opportunities to divert waste from a landfill or incinerator by initiating composting programs at a stadium or arena, ranging from collection of grass clippings and other landscaping wastes to collecting kitchen scraps, fan food waste, and compostable serviceware.

Composting reduces the environmental impacts associated with waste disposal. It can also save your organization money through reduced hauling, disposal, and fertilizer costs, although this depends on location. If composting facilities are farther away from a sports venue than landfills are, hauling costs might be higher (though reduced waste-hauling costs may compensate for this increase).

Among all recycling markets, composting infrastructure ranks among the least developed. Moreover, composting infrastructure varies widely by market. Most facilities will find that it makes the most sense to work with their current waste hauler or another local hauler to collect organic waste for off-site composting. Consult with your waste hauler to learn more about the services the company provides and the composting facilities available in your market. You can also consider sending your organic material to an anaerobic digester, if one exists in your area, or setting up a worm bin on-site and using the finished compost at your facility to help reduce the need for water, fertilizer, and pesticides (which in turn could cut your facility's costs). You can also join the EPA's free *WasteWise* program, which provides members with several benefits, including a technical assistance team that might be able to help your organization investigate composting. To learn more about how other sports facilities have integrated composting into their operations, check out NRDC's *Game Changer* and *Collegiate Game Changers* reports, as well as the waste and composting strategies in the NRDC *Greening Advisor*. Joining the Green Sports Alliance is another good way to learn about successful composting initiatives in stadiums and arenas across North America.

## WHY COMPOST?

According to the U.S. Environmental Protection Agency (EPA),<sup>9</sup> the amount of municipal solid waste (waste disposed by households and businesses) generated in the United States increased steadily from 1960 (88 million tons) to 2007 (257 million tons) but has decreased slightly since then, with an estimated 250 million tons of solid waste generated in 2011. Recycling rates (including composting) rose from 6.4 percent in 1960 to 34.7 percent in 2011. The largest component of U.S. municipal solid waste is organic materials, with food and yard waste accounting for about 28 percent of discards in 2011. Organic waste is also one of the primary components of waste generated at stadiums and arenas; for example, the Seattle Mariners estimated in 2011 that food and landscaping waste accounted for 51 percent of their overall stadium waste. If your venue has already developed a robust recycling program, it's likely that non-recovered organics such as food and yard waste make up the largest portion of your remaining waste. For sports venues, as for cities more broadly, developing a composting program or otherwise repurposing organic waste is key to reducing the amount of waste sent to landfills or incinerators.

When culturally influential organizations like sports leagues, teams, and venues adopt greener practices like composting, the benefits are threefold. First, reducing waste has direct environmental impacts by reducing the amount of material requiring hauling, lessening the need for landfills or incinerators. Second, publicizing your environmental achievements sends the message to fans and others that being a responsible environmental steward is an important part of how you do business. Ideally, fans will come to expect recycling and compost bins at their local sports venues and other places they go for entertainment. Third, when sports organizations adopt greener practices, that sends a powerful message up the supply chain and to sponsors that greener products and services are a priority—and this means that those greener products and services might become more available to other customers too.

### WM 2013 Sustainability Press Release

In 2013, all vendors at the Waste Management Phoenix Open were required to use compostable serviceware except for cold drink cups, which were recyclable. 100 percent of the waste generated at the event was diverted from landfill; 47 percent of the waste was composted, and over 16,000 pounds of unused food were donated to a local charity.



[https://www.wm.com/about/press-room/2013/20130806\\_WMPO\\_Milestone.jsp](https://www.wm.com/about/press-room/2013/20130806_WMPO_Milestone.jsp)

## ENVIRONMENTAL BENEFITS

Decomposing organic matter is the principal cause of methane gas emissions from landfills. Methane is a powerful greenhouse gas estimated to be 34 times more potent than carbon dioxide. Composting reduces the amount of waste directed to landfills or incinerators by transforming organic waste into useful fertilizer and other soil amendments, cutting the emissions of harmful greenhouse gases that contribute to climate change. Just as recycling returns usable materials to the manufacturing cycle, composting returns nutrients to the nutrient cycle. Using compost can displace the use of fossil fuel-derived fertilizers and the energy use, water use, and air and water pollution associated with manufacturing and applying those fertilizers. Compost can also be used to help restore depleted soil, which can help control erosion and aid in restoring forests, wetlands, and other ecosystems that we rely on for food, medicine, and recreation.

Implementing a composting program at a sports facility may include replacing plastic food serviceware with compostable serviceware, which also yields environmental benefits. Most plastic is produced from fossil fuel-derived products, which increases our consumption of nonrenewable resources. Fossil fuel exploration, drilling, processing, and transportation are ecologically harmful, contributing to thousands of oil spills each year, toxic air emissions, toxic waste, water pollution, and habitat destruction. In addition, plastic litter in oceans and waterways is a growing problem, threatening marine life and public health, and contributing

to the degradation of marine habitat. By purchasing bio-based compostable food serviceware, and by composting these products at the end of their use, your organization can help reduce these impacts.

The environmental benefits associated with composting include:

- diverting organic materials from landfills, helping to reduce methane production;
- diverting organic materials from waste combustors, helping to reduce nitrogen oxide greenhouse gas emissions;
- reducing the need for fertilizers and pesticides manufactured from fossil fuels;
- recycling and replenishing nutrients in soils;
- creating a soil amendment that improves soil structure, water retention, and nutrient storage capacity of contaminated, compacted, or marginal soils, as when restoring forests or wetlands; and
- recovering energy as well as producing soil amendments, by means of a type of organics recycling called anaerobic digestion.

The **Seattle Mariners** are a great example of a team that has worked hard to improve its composting and recycling. Through an aggressive program that included switching to compostable serviceware and packaging, the Mariners were able to improve their game-day waste diversion from 38 percent in 2009 to 90 percent today. Safeco Field's robust composting and recycling program diverts plastic bottles, cans, paper, cardboard, food waste, grass clippings, and compostable serviceware through mechanisms such as partnerships with vendors and improved discard stations (there are only 17 garbage cans in the entire stadium; most of the bins placed around the facility are for compostables and recyclables). This 90 percent diversion rate is saving Safeco Field \$100,000 per year. A critical aspect of the program is the educational component—for example, signs explain that the serviceware is compostable and recycling bins are easy to recognize. Through a partnership with their compost provider, the Mariners provided compost made from the stadium's organic wastes to fans as part of an educational promotion.



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NRDC Game Changer, Seattle Mariners case study,  
[www.nrdc.org/game-changer](http://www.nrdc.org/game-changer)

## SETTING UP ORGANICS RECYCLING AT YOUR FACILITY

### ECONOMIC BENEFITS

Many sports teams and venues are saving money by composting organics within a comprehensive waste management program that also includes waste reduction and recycling (see NRDC's Game Changer and Collegiate Game Changers reports for numerous examples). Though landfill tip fees vary greatly across the country, diverting waste through composting should help reduce the amount of money paid to dispose of waste in landfills, which may result in overall cost savings (though it is also possible that hauling fees may increase if the composting facility is farther away than the landfill). Your municipality should be able to inform you if financial incentives are available for diverting organic waste. Some venues may be able to install a form of composting on-site, or join with other generators to help develop a nearby composting system, which could reduce hauling costs. Using finished compost on your facility grounds instead of petroleum-derived soil amendments might also help reduce costs.

Leading by example can help shift the market. By demonstrating an interest in composting, your organization can help contribute to the expansion of composting infrastructure, which may eventually help reduce some of the costs.

Potential economic benefits associated with composting include:

- avoiding landfill or waste combustor tip fees;
- creating an often lower-cost alternative to petroleum-derived fertilizers;
- helping to ensure compliance with any legislation prohibiting organic materials in landfills; and
- creating more jobs than do landfilling or incineration.

The composting programs at the 2011 and 2012 **US Opens** collected organic waste from kitchens as well as fan waste from the Food Village and the eateries in and around Arthur Ashe Stadium. During those two events, the U.S. Tennis Association collected 243 tons of organic waste, which was turned into compost for landscape and farming uses. In 2013, the compost initiative also collected more than 12,000 gallons of cooking grease to be converted into biodiesel fuel.

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NRDC Game Changer, USTA case study,  
[www.nrdc.org/game-changer](http://www.nrdc.org/game-changer)

When beginning or expanding a composting program, start by conducting an inventory of your existing waste infrastructure. Evaluate your current approach to collection, hauling, and materials processing (if any) as well as your budget and staff training procedures. You will need to determine what infrastructure, resources, and staff time are currently devoted to recycling, composting, and waste management more generally and consider the available budget, infrastructure, staff time, and space available for an expanded program. Most facilities that collect organic materials for composting arrange for a hauler to take their organic waste off-site, but your facility may be able to compost on-site. (Later sections of this guide will discuss these options in more detail.) Work with your hauler to determine what the overall costs of expanding your program will be. You can also reduce costs by incorporating organic waste reduction efforts such as donating unsold prepared food, "grasscycling" (leaving grass clippings where they fall so they can return nutrients to the soil), and collecting cooking oil, fats, and grease for biodiesel production.



© USTA



## WASTE AUDIT

A waste audit is an analysis of your facility's waste stream. Auditing the materials generated at your facility will help you identify what types of recyclable, compostable, and other materials your facility generates, and how much of each category is currently recovered for recycling or discarded. A waste auditor investigates the sources, composition, weight, volume, seasonal variation, and destinations of the materials that your venue generates. Using the data collected, you can identify the financial feasibility, costs, and benefits of enhancing your recycling and composting program.

Your waste hauler or local government may be able to conduct a waste audit for you. You might also consider joining the EPA's free [WasteWise](#) program, which provides members with several benefits, including a technical assistance team that can help your organization conduct a waste audit and identify waste reduction opportunities.

## WORKING WITH YOUR HAULER

Before initiating a composting program, contact your current waste or recycling hauler to see if the company is able to take your organic waste for composting. You will also need to determine whether the compost facility that you plan to use can handle the types of organic waste you are producing. You should also work with your hauler to collect recyclables and compostables in a way that helps maximize the amount of material that can be processed for marketing. Identify the types of organics your hauler might not accept, and find out if there are any special requirements, such as putting organic waste in special receptacles or placing the receptacles in a particular location for pickup. It's important to involve haulers in the planning phase of your initiative to make sure your goals align with their capabilities. Sometimes

partnerships with haulers can help create new initiatives, as experienced by several teams and venues that asked their haulers to assist in implementing composting at their facilities.

If your hauler for garbage or recycling is able to handle organics collection, negotiate a composting hauling contract (and integrate this into your overall waste budget). If you're working with a new hauler, ask that the different costs in the contract, including hauling and landfill disposal fees, be clearly broken out. Sometimes, due to greater distance, a hauling fee for composting is higher than a hauling fee for landfilling, although you might save money on avoided landfill tipping fees (the amount of savings will depend on your location, as landfill tipping fees vary greatly). Also check with your hauler and other sources to find out the market value of the recyclables you recover, which might help you negotiate a lower hauling rate for those materials.

Budget for a pickup frequency that matches your logistical needs. You will want to ensure that pickups correspond with your ability to store waste, to handle traffic, and so on. Also factor in odor control when determining pickup frequency.



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The **San Francisco Giants** evaluate their entire waste management program as one system and work with their waste haulers, concessionaires, and other partners to identify inefficiencies and cost savings potential. Jorge Costa, senior vice president of ballpark operations, offered an example: "To upgrade our loading dock, we proposed to spend something like \$60,000 to revamp the layout, so we needed to calculate how we would recoup that investment. We worked with Recology, our waste partner, to minimize the number of trash hauls and dumping costs. We reevaluated and economized on the bags and bins we were using. We also thought more systemically about savings around the ballpark by cutting down on broom costs and labor costs."

[LEARN MORE](#) [NRDC Game Changer, USTA case study, www.nrdc.org/game-changer](#)

The **Portland Trail Blazers** divert nearly 90 percent of their operations waste from landfill (about 1,000 tons annually) through initiatives such as extensive, well-marked recycling stations for visitors and a food waste composting program with vendors. According to the Blazers, 100 percent of food waste at the arena is collected for composting, and all food and beverage serviceware is compostable.

[LEARN MORE](#) [NRDC Game Changer, Portland Trail Blazers case study, www.nrdc.org/game-changer](#)

## LOCATING RECEPTACLES

When siting compost collection bins at your facility, the first step is to map your current collection bins for garbage and recycling and identify any additional composting receptacle and signage needs. Collecting separated organic waste may require different locations (e.g. near where food is prepared) for receptacles than those previously used for landfill collection and/or more frequent collection. Make sure you've located well-marked, easy-to-use recycling containers throughout your facility, and co-locate recycling, compost, and garbage bins where feasible. Some venues have taken this strategy even further by creating "zero waste" stations with fewer landfill containers and a greater number of bins for recyclables and compostables. Place bins strategically, wherever you think people are likely to need them—near concession areas, exits, and so on. Optimally, place bins in public areas so that at least one is always in view (roughly every 25 feet). Be sure to provide clear, consistent signs for each type of disposal at each location. Consider creating distinguishable, branded containers that are easy to identify and/or color-coding containers or bags.

Consider starting your food waste collection in controlled areas such as suites. Since food waste from suites is generally collected directly by staff, as opposed to disposed in containers by guests, it is less likely to be contaminated by non-compostable packaging than food waste collected in public-facing containers.

Work with concessionaires and vendors to determine the best locations for compost receptacles behind the

scenes, wherever food is processed or prepared. You will need to ensure that staff in these areas are made aware of the locations of these containers and trained to use them properly.

In addition to locating compost collection bins in your facility, consider whether other organic waste will be included in your program (e.g., landscaping waste), and where and how to collect that if so.

## SUPPLEMENTING COLLECTION

Consider using "recycling green teams" of volunteers to collect recyclable and/or compostable packaging from tailgaters in the parking lots and from the stands during and after events. You can also use your staff as needed to supplement waste collection and waste sorting during and after events. Staff can be trained to hand-sort non-compostable packaging out of the compostable stream before hauler pickup. Make sure to comply with all health and safety laws. If you are able to supply food and beverage packaging that is primarily recyclable and compostable, you may find that it is easier to remove garbage from compostables and recyclables than it is to remove compostables and recyclables from garbage.

**The Ohio State University** is home to one of the most successful stadium recycling and composting programs in the United States, diverting from landfill more than 90 percent of its waste through recycling and composting. Ohio State decided from the outset of its composting program to reduce contamination by labeling food and fiber as compost and everything else as recycling, with no trash bins in the stadium. The team focused on fan education, including messaging simple enough to be conveyed in the chaotic concourse environment, and stationed workers at clearly marked, color-coded receptacles around the stadium to help educate fans at the point of disposal. Ohio State worked with Sodexo, its concessionaire, to educate and encourage participation of concession staff. Postgame sorting processes helped reduce contamination.

**LEARN MORE** NRDC Collegiate Game Changers, The Ohio State University case study, [www.nrdc.org/sports/collegiate-game-changers](http://www.nrdc.org/sports/collegiate-game-changers)



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## WHAT CAN BE COMPOSTED

What you can collect for composting at your venue depends on the requirements of your composting system and hauler. Different composting facilities and haulers have different requirements, so be sure to verify the specifics with your hauler and composting facility before creating training materials, signs, and so on. Also, ask your hauler to clarify what percentage and types of contamination (non-compliant materials) are permissible.

As a rule of thumb, if it was once alive, it can be composted. Here are some examples of waste materials that are typically compostable, may be compostable, and are not compostable:

### TYPICALLY COMPOSTABLE:

- Fruits and vegetables, including peels, cores, seeds, etc.
- Bread and grains (pasta, rice, etc.)
- Meat and dairy products (seafood, cheese, etc.)
- Eggs and eggshells
- Leftover or spoiled food (donate unused edible prepared food)
- Tea bags and loose tea leaves (no plastic)
- Coffee grounds and paper coffee filters (no plastic)
- Paper napkins and paper towels
- Paper cups and paper plates (not plastic-coated)
- Other food-soiled paper (not plastic-coated; if not food-soiled, paper should be recycled instead of composted)
- Grass clippings
- Leaves, flowers, and other plant matter (branch diameter under 1 inch)

### MAY BE COMPOSTABLE (DEPENDING ON SYSTEM):

- Liquids (broth, sauce, beverages, etc.)
- Milk cartons and other “waxed” (actually plastic-coated) containers
- Food-soiled cardboard (if not soiled, cardboard should be recycled)
- Bioplastic/compostable serviceware (certified to ASTM-compliant compostability specifications)
- Fats, oils, and greases (can be collected separately for biodiesel production)
- Woody landscaping waste (branch diameter over 1 inch)

### NOT COMPOSTABLE:

- Stickers on individual fruits and vegetables
- Metals
- Glass
- Plastics, including foam (polystyrene), bags, and film
- Soil, rocks, concrete, etc.
- Composite packaging (juice boxes, chip bags, condiment packets, etc.)
- Treated/painted wood (plywood, pressboard, etc.)
- Textiles (clothing, rags, linens, etc.)
- Cat litter or animal feces
- Diapers

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The **Montreal Canadiens** worked for more than half a year to increase their landfill diversion rate, starting with the installation of 945 new three-tier recycling and garbage bins around the building. The team also formed a Green Squad of nine staff members responsible for managing waste during events and tracking waste flow. In addition, a team of 10 people manually sort all disposed materials at the end of each event. With these measures in place, the Canadiens succeeded in achieving an average recycling

and composting rate of 85 percent (approximately 1,000 tons annually, including more than 230 tons of compostable materials).

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## SIGNS AND TRAINING

In order for your composting program to work, fans and staff need to be able to clearly understand which items belong in which bins. Integrate your composting system into your recycling and waste system by using consistent signs and container types throughout your venue. Ensure that highly visible signs are posted for fans and staff at all composting and recycling receptacles. Develop simple, easy to understand signs that clearly and visibly identify acceptable items for each receptacle. Using a combination of images and words helps. Include translations into languages other than English as appropriate. Consider opportunities to involve sponsors in funding and branding receptacles.

Make sure that all staff, including staff from facilities, purchasing, food service, housekeeping, and security personnel, are informed about the composting initiative, and solicit their ideas for implementation. Work with all concessionaires and vendors to maximize the composting of organic waste from food preparation. For collection of back-of-house waste, train all relevant staff on what they should separate for compost and on procedures for safe, hygienic collection and disposal. If you are using compostable serviceware, be sure that staff are trained on which items are compostable. Train front-of-house staff on how to guide fans to the correct waste receptacles.

Make sure an ongoing training and communications program is in place to routinely train new staff and to convey any changes in compost collection procedures to existing staff.

In 2011, **STAPLES Center** in downtown Los Angeles started a composting program in its kitchens. The venue hopes to incorporate front-of-house compost collection eventually, but in the meantime, organic waste is collected back-of-house in two of the main kitchens, where most of the food is prepared. With this system, only the back-of-house chefs and kitchen staff need to be trained. Organic waste is placed in compost receptacles, which are then transferred to the loading dock and picked up by a hauler for composting. This program is already saving money for STAPLES Center by reducing the weight of its disposed waste stream. In April 2012, for example, the compost program diverted 4.78 tons of food waste from going into the trash.

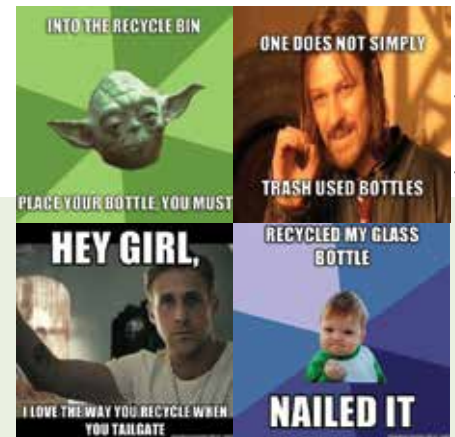
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## REDUCING WASTE

Work with staff and vendors to reduce the use of non-compostable and non-recyclable packaging and other materials that are “designed to be wasted,” in order to reduce the amount of materials needing disposal. Where feasible, substitute reusable packaging for disposable packaging; for example, you can provide water refilling stations to encourage the reuse of water bottles, or switch to reusable transport packaging. Other ways to reduce the amount of waste that you’ll need to pay to landfill include donating unused prepared food and having a biodiesel firm collect your fats, oil, and grease (or “FOG”).

The **University of Southern California**’s game-day composting and recycling initiative incorporates education with a dash of humor. “Our student team worked on program marketing and came up with a variety of ways to encourage recycling while making people laugh,” said Halli Bovia, sustainability program manager. The team laminated and posted humorous signs based on popular Internet memes near waste diversion stations around athletic venues and in the tailgating areas at football games.

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Photos courtesy of University of Southern California.



# SERVICEWARE AND PROCUREMENT

Besides food waste, the majority of waste generated in the public areas of stadiums and arenas consists of beverage containers and food serviceware (trays, cutlery, cups, clamshell packaging, etc.). Ecologically intelligent procurement can play a big part in reducing the waste sent to a landfill. Buy food serviceware and other materials that are recyclable or compostable (and packaged in materials that are also recyclable or compostable), and communicate to your vendors and suppliers your requirements for compostability or recyclability. (For example, if your community recycles only certain types of plastic, try to purchase only those types.)

At many venues, beverages and food are served in non-recyclable, non-compostable containers. Consider purchasing cups and other food serviceware items that are recyclable and made from recycled content, or buy serviceware that is compostable and made from alternatives to fossil fuel-derived plastics (such as bio-based plastics; see below for suggested specifications). While options are currently limited, the market for compostable and recyclable serviceware products is slowly evolving. Talk with your vendors and suppliers about your waste diversion goals and let them know you would like to use packaging and serviceware that is recyclable or compostable.

If you have several concessionaires and vendors, coordinate their choice of packaging materials where feasible so that serviceware and packaging are easily and consistently identifiable as compostable or recyclable. The fewer types of packaging materials you need to deal with, the easier it will be for guests to understand the proper disposal for each.

When choosing packaging for food or beverages, check with your recycler or composter regarding any restrictions

on food contamination. Paper or plastic serviceware that is food-soiled may not be recyclable in your particular system, so be sure to tailor your purchasing to match your recycling and composting markets. If plastic cups can't be recycled in your system, for example, you might consider switching to bio-based cups that can be composted (food contamination should not be an issue for compostability).

In addition, buy paper products manufactured with postconsumer recycled content. Buying recycled-content paper and other recycled products means you are closing the recycling loop, and in that way you will be helping to ensure that there are markets for recovered materials.

## COMPOSTABLE PLASTICS

Choosing bio-based/compostable plastic products is tricky. Look for the following characteristics:

- **Choose compostable plastics that are certified as complying with ASTM International specifications for compostability.** In the United States, the primary third-party certifier of ASTM-compliant compostable plastics is the Biodegradable Products Institute (BPI). Check the BPI catalog for a list of certified compostable products, or look for products bearing the BPI compostable logo. ASTM has two certification categories related to compostability. These are:
  - **ASTM D6400** ([www.astm.org/Standards/D6400.htm](http://www.astm.org/Standards/D6400.htm)). This is the specification for plastic products that are designed to be composted in municipal and industrial aerobic composting facilities. If you plan to collect food waste for composting, it would help to have your serviceware certified to this specification.

The **San Francisco Giants** found that while compostable food containers worked for their system, compostable plastic cups weren't the right solution for them. When the Giants offered compostable cups in their ballpark, fans were confused and did not consistently compost them, so the cups ended up contaminating the recycling stream. The Giants changed their serviceware options so all of their drinkware was recyclable, while the food packaging remained compostable. This simplified procedures and messaging and helped the team to achieve a diversion rate of nearly 90 percent.

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- ASTM D6868 ([www.astm.org/Standards/D6868.htm](http://www.astm.org/Standards/D6868.htm)). This specification covers packaging with a plastic coating (including plastic-coated paper and paperboard) that is designed to be composted in municipal and industrial aerobic composting facilities.
- **Even when materials are certified as compostable to ASTM specifications, some composting operations may have trouble processing particular items.** Work with your composting company to test serviceware to ensure that it will break down completely in the composter's operations. Note that the ASTM standards for compostability apply to plastics designed to be composted in large-scale aerobic composting operations; these plastics are not compostable in a home composter or in most anaerobic digestion processes. There is no ASTM standard for compostability of bioplastics in anaerobic digestion.
- **Avoid plastics that are labeled "biodegradable" or "oxodegradable."** Biodegradable is not the same as compostable; "biodegradable" may mean only that a product will eventually break down, but not necessarily within a specified time frame or to a specified particle size.. While biodegradability is an important requirement for some types of purchases, such as cleaning products, it is not an environmental asset for products such as food serviceware or for anything else that might be destined for a landfill, where biodegrading will produce methane. Compostability (compliant with ASTM D6400 or ASTM D6868 specifications) is the certification you should look for in serviceware.
- **Although not essential from an operations perspective, for ecological reasons we suggest prioritizing waste-based bioplastic options.** Bioplastics made from agricultural residues (such as bagasse, which is left over from sugar cane production, or straw from wheat or rice production) do not engender the adverse ecological and potential economic impacts associated with crops

grown specifically for plastics or fuel production. There are more than 2 billion tons of agricultural residues generated each year in the United States alone, most of which are currently disposed of as waste. Corn-based bioplastics like PLA are among the most widely available bioplastics. While PLA represents a positive first step away from fossil fuel-derived plastic, the use of corn and other crops raises concerns about land-use impacts and the price of food. These impacts are all reduced by specifying products made from waste-based materials.

## PAPER-BASED SERVICWARE

Concession napkins, paper towels, and uncoated paperboard (thin cardboard) are made of bio-based fibers and should be acceptable in your compost collection regardless of ASTM certification, though it's always best to double-check with your composter to be sure that these materials work for their particular system. Paper products coated with plastic may be contaminants for your composter (unless certified to ASTM 6868 specifications). Food-soiled paper, including uncoated cardboard, should also be compostable, but, again, confirm this with your composting company. Cardboard and paper that are not food-soiled should be collected for recycling. Paper made with recycled content produces significantly less air and water pollution, is less disruptive of habitats, and uses less energy than paper made from trees. Paper can be recycled again and again but composted only once, so recycling produces the best resource savings associated with discarding paper. When paper is food-soiled, it may not be recyclable and should be composted instead. Check with your recycler to confirm the characteristics of the paper it will accept for recycling.

After changing cutlery, plates, napkins, and cups to compostable products, the **Philadelphia Eagles** struggled to find a compostable wrapper for their hot sandwiches. In partnership with their concessionaire, ARAMARK, they continued to ask for the product they needed and at the end of 2011 were finally able to find a compostable sandwich wrapper that met their quality standards.



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# COMPOSTING INFRASTRUCTURE

When you decide to implement an organics collection program, you will need to determine whether the organics will be composted on-site or off-site. Most facilities will find that due to space limitations and the potential for odors, the best option for them is off-site composting. If you choose this option, you will need to determine who will collect the organics for composting (your current waste hauler or another hauler) and what type of facility you will be using. Your choices may be limited by what is available in your area or restricted to facilities used by your hauler, but it is useful to understand the various options for composting, especially as this is a rapidly growing area and new facilities are coming online in many locations.

When deciding on a compost system, consider the kinds of organic waste you are producing (e.g., food waste, compostable serveware, landscaping waste), and be sure you are selecting a composter that will accept and effectively process those materials. To maximize the benefits associated with composting, collected organic waste should have minimal contamination. Building a successful compost infrastructure requires considering both the desired inputs (suitable organic wastes, minimal contaminants such as plastics) and the desired outputs (e.g., soil amendment, organic fertilizer, energy).

## AEROBIC COMPOSTING

Aerobic composting (meaning “with oxygen”) is a process of combining organic matter, such as leaves, grass clippings, and food waste, with oxygen and moisture to facilitate its decomposition into finished compost (also called humus). Most industrial-scale composting is aerobic composting; it may be done in an outdoor setting (usually in piles called windrows) or in an enclosed environment (including “in vessel” composting, which is composting in a building, container, tank, etc.).

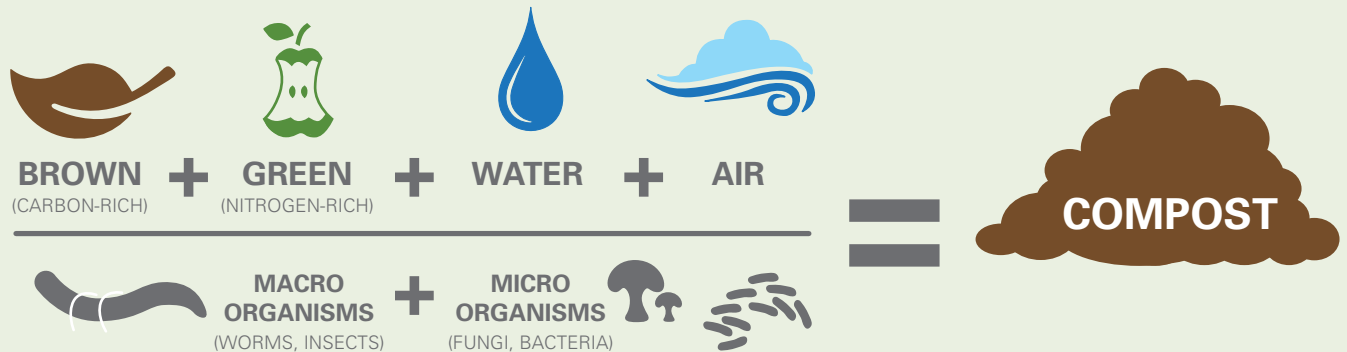
The natural process of decomposition is assisted in aerobic composting by incorporating a balance of carbon-rich materials (e.g., woody waste, paper) and nitrogen-rich materials (e.g., food waste, grass), as well as providing the appropriate levels of moisture and air (by physically turning the piles or other methods). It generally takes several weeks to months for the aerobic composting processes to be completed. Although aerobic composting in ideal circumstances is relatively odor-free, in practice there is usually some odor associated with industrial-scale operations, so they tend to be located away from populated areas.

One key advantage of aerobic compost systems is their ability to break down a wide variety of organic wastes, including woody waste, food waste, food-soiled paper and cardboard, and some compostable plastics. Another advantage of aerobic composting is that the thermophilic (heat-loving) micro-organisms that function in the process generate heat, which kills most pathogens and destroys most weed seeds. Another benefit is that the finished compost is nutrient-rich humus, which can be used as natural fertilizer and to replenish depleted soils.

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AEROBIC COMPOSTING





## ANAEROBIC DIGESTION

Anaerobic digestion (meaning “without oxygen”) is a type of organics recycling in which organic materials such as food waste and grass clippings are subjected to controlled breakdown in an enclosed chamber in the absence of oxygen. Microorganisms that thrive in an anaerobic environment break down the organic material into an energy-rich biogas primarily composed of methane (CH<sub>4</sub>) and carbon dioxide (CO<sub>2</sub>), which can be used to generate electricity or heat or to create liquid fuels. Anaerobic digestion also creates solid and liquid products (digestate) that contain nutrients such as nitrogen. Another benefit of anaerobic digestion is that the energy embedded in food waste is captured and used to produce energy, rather than released as heat.

An ideal anaerobic digestion system will create both energy products and digestate that can be used to make soil amendments. However, in order to be usable as fertilizer, the digestate may need to be further processed to break down materials that don't decompose in the anaerobic process (such as woody waste and compostable plastics) and to remove pathogens (since, depending on the system, these may not be fully destroyed in the anaerobic digestion process). For this purpose, many anaerobic digesters are accompanied by aerobic compost systems, which compost the digestate to create a usable soil amendment. Many communities have more than one organics management system. The size of digesters can be tailored to fit a community's particular needs, and systems can be combined with each other.

Anaerobic digestion may work best for venues prioritizing recycling food waste and grass clippings, which easily break down in the anaerobic process. Organic waste that contains significant amounts of food-soiled paper, compostable bioplastics, and woody landscaping waste may not break

down sufficiently in an anaerobic digestion process, and may need to be sent to an aerobic composting system (either after or in lieu of anaerobic digestion). If there is an existing anaerobic digester in your area, look into the requirements for organic feedstocks, and see if it is a good match for the materials you are hoping to divert.

## OTHER ORGANICS MANAGEMENT METHODS

Worm composting (“vermicomposting”) is a process in which certain species of worms, bedding (e.g., shredded paper), and food waste are combined in a box or other container in the right proportions to facilitate digestion of the food by the worms. The resulting worm castings are a nutrient-rich natural fertilizer. Vermicomposting can be used to process only certain types of food waste (excluding meat, dairy, fats, oils, etc.), and the process typically takes several weeks. While found most often in households, there are medium-scale institutional worm composting systems on-site in some locations, including schools.

Compost tea is a nutrient-rich liquid fertilizer that is typically made by steeping compost in water for several days. Some venues (such as the University of Colorado Boulder) have introduced compost tea into their irrigation systems, combining it with other organic fertilizers to reduce or eliminate the need for chemical fertilizers.

In some cases, food waste can be used as animal feed. You may want to look into this option for food waste disposal, particularly if there is no composting infrastructure available in your area. Also, used cooking oil can be converted to biodiesel; consider collecting used cooking oil separately for collection by biodiesel producers.

In 2011, the **University of Colorado Boulder** implemented a pesticide-free, organic fertilizer management system for all campus turf, including most sports and recreation fields. As part of this program, CU-Boulder invested roughly \$30,000 to install seven 250-gallon brewing tanks across campus to make compost tea, a biologically active organic liquid fertilizer. A total of 70 pounds (10 pounds per tank) of premium vermicompost (compost from worm bins) is brewed to yield 1,750 gallons of compost tea, which is then applied over roughly 70 acres through the campus-wide sprinkler system. The overall pesticide reduction program cut the university's use of herbicides on turf areas by 93 percent by the end of 2012 (compared with 2009). The benefits of using this organic fertilizer and pest management system on campus sports fields include improved drainage, higher oxygen levels, and less compaction, leading to faster turf recovery after intensive use.

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## FOOD DONATION

Instead of throwing away unsold prepared food, consider donating it to a nearby food bank or homeless shelter. Contact your local food bank, or visit Feeding America for information about food banks near you. Consider signing up for the EPA's Food Recovery Challenge, which helps organizations reduce food waste through donation, source reduction, and composting. Also visit Rock and Wrap It Up! for information about its food donation program, which works with sports organizations to help feed the hungry in their communities with clubhouse and facility food recovery.

Food wasting is a particularly unpleasant feature of American society. Every year we throw out at least 31 percent of all the food available for consumption, about 133 billion pounds annually. Less than five percent of food waste is recovered in some form of organics recycling, and the rest winds up in landfills and incinerators.<sup>10</sup> When food is delivered to a landfill, it decomposes and releases methane, a potent greenhouse gas, into the atmosphere. By donating food, you help feed the hungry while lessening the amount of waste being sent to landfills, thus helping to reduce these emissions. Donating leftover food also reduces the need for additional food production, thereby easing the environmental impacts associated with agriculture, including water pollution and habitat destruction. If we could recover one-third of the food wasted in the United States each year (and distribute it appropriately), we could feed all 50 million food-insecure Americans their entire diet all year.<sup>11</sup>



Starting in the 2010–11 season, the **National Hockey League** established a league-wide initiative to work with Rock and Wrap It Up! to donate unused prepared food. All 30 NHL teams committed to pack

up all such concession food on game nights for redistribution to local shelters and other places that serve people in need. Over the course of the initiative's first full season, NHL clubs provided 163,000 meals to people in need and diverted 105 tons of food from landfills and incinerators across North America. According to the Environmental Protection Agency, the NHL reduced greenhouse gas emissions by the equivalent of 79 metric tons of carbon dioxide through this initiative. Since 2010, the league-wide food recovery program has diverted more than 300 tons of waste from landfills and incinerators and provided local shelters with more than 400,000 meals. For example, since October 2010, the Edmonton Oilers have provided over 20,600 pounds of food to the Edmonton Foodbank program, generating almost 16,000 meals for their various agency programs.

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## ON-SITE COMPOSTING

Most of this guide focuses on off-site composting, which is what the majority of stadiums and arenas will find most practical. However, some venues may want to explore installing an on-site anaerobic digester, vermicomposting, or another compost system instead. One of the advantages of an on-site system is the reduction of hauling and disposal costs (though there may be additional costs associated with designing, obtaining permits for, installing, and maintaining the system; added staff time and training; and the transport of organics from one part of the facility grounds to another). Besides potential cost reduction, other advantages of on-site systems include reduced organic waste storage time (which in turn alleviates odors in storage locations) and the production of usable soil amendments and/or energy, which may decrease the costs associated with the purchase of energy and fertilizer.

Challenges associated with on-site composting include the need to allocate physical space for the system; funding for installation and maintenance; staff time; and other resources such as vehicles and the electricity, water, or chemicals required as inputs. You may need to designate and train staff to maintain the compost system, which will incur variable costs depending on its complexity. You may also find that you are not producing enough organic waste for an on-site composting process to work efficiently, unless you combine your waste with that of other generators nearby. Locating a compost system may also be challenging because it is likely to produce problematic odors at some time during its operation.

The **Cleveland Indians** donated more than 18,400 pounds of food to the Cleveland Foodbank after home games during the 2009 season, which translates to 14,300-plus meals used to feed those in need.

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## OFF-SITE COMPOSTING

For some venues, particularly those looking to recycle only food waste, an anaerobic digester may be a candidate for on-site installation. Depending on the system, anaerobic digestion may require regular inputs of organic waste, so this system might work best for generators such as college sports venues which could combine their organic waste with that of other nearby generators. An additional advantage is that anaerobic digesters produce energy, which you may be able to sell or use at your venue. Most digesters cannot process food serviceware or woody landscaping waste, so you may need to combine this system with aerobic composting if you plan to compost those materials as well.

Landscaping waste may be handled separately from food waste in an on-site compost pile, provided that this does not pose space or odor concerns. Your facility may also be able to “grasscycle,” leaving mowed grass clippings in place to decompose naturally.

When considering an on-site compost system, be sure to clarify the required inputs beyond organic waste (e.g., some require adding electricity and water), whether the types of waste you are generating can be processed in the system, and what the outputs are. Some organics-processing technologies use energy to de-water and shred food waste; while this may be desirable for reducing odors and helping prepare organic matter for further treatment, these technologies should not be confused with composting. Any machine that claims to produce “compost” in a matter of hours is likely merely de-watering and shredding organics, not truly composting them. In order for the biological process of composting (including digestion) to actually occur, microorganisms need time (usually weeks or months) to process the wastes until they are biologically stable.

One of the challenges of setting up a collection program for organic materials is finding a composter. If you are planning to send your organic waste off-site, you (and/or your hauler) may need to do some research to locate compost or anaerobic digestion operations in your area. Your city or county may be able to help. Composting infrastructure is still underdeveloped in many regions around the country, but your interest can help promote this market locally.

When considering a composter, be sure to clarify whether the types of waste you are producing are acceptable in that system. For example, most composters have restrictions on the types and quantities of contaminants (nonorganic waste) that they can handle. Composting facilities have different abilities to handle compostable bioplastics such as food serviceware; even if your serviceware is certified as compliant with ASTM standards for compostability, some items still might not be compostable in the particular system your composter is using. There is currently no ASTM certification for bioplastics that guarantees compostability in an anaerobic digestion system. Be sure to verify that your collection systems are designed to capture the types of waste and levels of contaminants that are compatible with the requirements of the composter.

If there is no compost facility or anaerobic digester near your venue, you might be able to work with your municipality or waste hauler to help develop that infrastructure. Other facilities in your area that produce food waste and landscaping debris might be interested in contributing to a combined organic waste stream for composting. Consider partnering with local restaurants, schools, hospitals, and other institutions to work with haulers and municipalities

The **San Francisco Giants** have won the MLB Green Glove Award six years in a row for being the leading team in recycling and waste diversion. The Giants’ aggressive recycling and composting program has ratcheted up their waste diversion rate from 57 percent in 2009 to over 86 percent in 2013. According to Jorge Costa, senior vice president of ballpark operations, one secret to the team’s success is hand-sorting waste. “We process all waste at the end of the game by hand as it comes through the loading dock,” Costa said. “Even though it’s costly and a dirty job, we get our money back and definitely see dividends.”



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to develop composting infrastructure. You can also check with your current garbage haulers to see if they have other clients who are interested in composting. Consider looking outside your immediate locality for existing compost sites or digesters that you may be able to work with at least in the short term, while seeking opportunities to help spur development of infrastructure nearer to you. Even if you aren't able to find a composter in the short term, continue regular dialogue with your waste and recycling haulers about your desire for composting—many waste service providers are creating compost systems in response to increasing demand.

Compost facilities can operate at various sizes, and they can sometimes be tailored to the needs of a particular community. For example, some compost operations are able to direct different feedstocks rich in particular nutrients into different parts of their process, to create a variety of products that can be used by local farmers, landscapers, and others. By working with farmers, municipalities, and other potential users, compost operations can determine which products are most needed in the community (e.g., a fertilizer rich in

nitrogen for a specific crop) and match those needs to their ability to create different compost products. When setting up a compost operation, it's important to consider the offtake market potential and develop systems that will create useful and marketable soil amendments, and not focus merely on keeping materials out of the landfill.

If your community has laws affecting organics management, make sure you are in compliance with those laws. For example, San Francisco has instituted mandatory recycling and composting laws for residents, businesses, and events. As of February 2014, 25 states had some form of ban on organics in landfills.<sup>12</sup> For example, in Massachusetts, starting in July 2014, large generators of organic waste (at least 1 ton per week) will be required to donate or otherwise repurpose usable food and to send any remaining food waste to a compost operation, anaerobic digestion facility, or animal feed operation. In addition to offering information on legislation pertaining to organics disposal, your city or county may be a good resource to find out if there are any financial incentives for diverting organic waste.

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Beginning in 2011, **University of Texas Athletics** teamed up with Keep Austin Beautiful to launch a composting program on football game days. In its second year, the program collected 16,600 pounds of compostable materials.

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When the **Philadelphia Eagles** started their composting program in 2009, there were no nearby commercial composting facilities. "We could only find a farmer from Neshaminy [in Pennsylvania] who literally came with his truck to load up our compost," said Don Smolenski, president and former COO. "But as we added more kitchens, we quickly had too much for him. So we had to wait for larger facilities to come online and for the market to grow." Smolenski adds that patience and perseverance made the Eagles' composting program possible. "Finally a facility in Delaware could accept our material at the scale we needed."

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# MEASUREMENT

Tracking environmental data such as waste generation is important because it allows you to assess the performance of your composting program and identify opportunities for improvement. Measuring also allows you to set short- and long-term goals and compare your achievements with others in the field. Quantifying successes can help determine where your greening investments make the most impact. It also helps document progress, which is important in justifying investments in environmental initiatives by owners, staff, partners, and sponsors.

Working with NRDC, Major League Baseball, the National Hockey League, and the National Basketball Association have all implemented league-wide tracking systems for environmental metrics like energy consumption, water use, waste generation and recycling, and paper use. Take advantage of your league's measurement program if it has one. If your league doesn't yet offer an environmental tracking system, you can track your venue's waste generation using tools like the EPA's free WasteWise program, or even assemble your own spreadsheet with data supplied by utilities, waste haulers, and perhaps other vendors and service providers.

Waste haulers should be able to help you compile data on the amount of recyclables, compostables, and waste you generate, as well as the costs associated with disposal, recycling, and composting. Haulers do not typically provide documentation on diversion broken out specifically by material, but you may be able to work with your hauler in this regard. Consider building a measurement requirement for specific materials such as paper, plastics, and metals into

any waste hauler contracts. These materials have value in the commodities marketplace, and their sale might return revenues to your waste management program. Keeping track of these numbers can also help you set benchmarks and goals for future diversion. Tools such as WasteWise can also be used to calculate how much your waste diversion is helping to reduce greenhouse gas emissions.

At minimum, consider the following metrics for your waste program:

- Total solid waste produced (in pounds or tons)
- Cost per ton of non-recyclable waste disposed
- Percentage and weight of waste stream composted
- Percentage and weight of each material recycled from waste stream
- Cost per ton of materials recycled, and cost per ton of materials composted

In 2013, the **Pittsburgh Pirates** collected 1,041 tons of compostable material, contributing to an overall diversion rate of 71 percent, up from 36 percent in 2009. The Pirates are entering their seventh season of the team's "Let's Go Bucs. Let's Go Green." recycling initiative, as a result of which the team has recycled and composted more than six million pounds of discards since the program's inception. In conjunction with the team's concessionaire partners, Aramark and Levy Restaurants, the Pirates have switched to compostable serviceware and significantly increased compostable tonnage every year. In addition, in 2013 alone, the team donated the equivalent of 2,800 meals of unused ballpark food to local food banks.

**O.co Coliseum** (the former McAfee Coliseum), home of the Oakland Athletics and Oakland Raiders, became the first major league sports venue to use compostable cups and implement a composting program in May 2005. The Coliseum's extensive waste diversion program, with many recycling and compost receptacles placed throughout the stadium, has decreased its trash hauling costs by more than 20 percent. While bottles, cans, and paper discards go into recycling bins, almost all other products are composted. Cups, food waste, grass clippings, landscape trimmings, and other organic waste are collected and sent to a composting site managed by Norcal Waste Systems. The O.co Coliseum diverts about 400 tons of recyclables and composts 200 tons of organic waste annually. Each year its environmentally preferable purchasing program prevents the use of three tons of fossil fuel-derived plastic cups. The stadium's concessionaire, ARAMARK, donates all unused prepared food to local food banks as well.



NRDC Game Changer, Snapshots,  
[www.nrdc.org/game-changer](http://www.nrdc.org/game-changer)



## FAN ENGAGEMENT

Informed participation by fans in your composting program is essential for its success. There is no such thing as too much fan education about proper sorting of organics and other recyclables. Make sure fans know about your initiative through visible, easy-to-understand signs at your disposal bins and throughout the venue. Announcements on the scoreboard or videoboard and other in-game messages about composting and recycling, as well as notices in game-day programs, can help fans dispose of materials correctly. Reach out to tailgating fans with information and collection strategies for recyclables and compostables. Use willing fans as volunteers to help with collection. Invite community participation in green-themed activities or events, such as a compost giveaway, to promote your composting initiative. Feature ongoing community outreach describing your green efforts, and consider including fan education about your initiatives on your website and in social media.

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In 2008, the **University of Colorado Boulder** athletics department partnered with the school's Environmental Center and facilities management department to implement a "zero waste" system at Folsom Stadium. Athletics branded the effort "Ralphie's Green Stampede" (named for the school's mascot, Ralphie the buffalo) to market the program to potential corporate sponsors, and it worked: White Wave Foods, Boulder Toyota, Eco-Products Inc., and the stadium concessionaire, Centerplate, all signed on with sponsorships that helped fund the up-front infrastructure and outreach costs. Dave Newport, director of the Environmental Center, noted that the "zero waste" program had relatively low implementation costs, and he hopes that ongoing costs will go down over time as the price of compostable serviceware becomes closer to that of traditional fossil fuel-derived plastic disposables. "The program is also saving money thanks to reduced trash disposal costs," said Newport.

[LEARN MORE](#) NRDC Collegiate Game Changers, University of Colorado Boulder case study, [www.nrdc.org/sports/collegiate-game-changers](http://www.nrdc.org/sports/collegiate-game-changers)

## VENDORS AND SPONSORS

Develop an environmental policy governing recycling, composting, and waste disposal; also include environmental specifications in purchasing policies (e.g. for paper or cleaning supplies), and vendor contracts. Greening is an ongoing process of continual improvement, because better products enter the market all the time. If you aren't able to find the product that meets your environmental needs, keep looking, and continue to let your vendors know what you want; your vendors in turn can work with their suppliers to help improve the chances that the products you're looking for will become available (and affordable). Education of staff, fans, vendors, and partners is also an ongoing process.

Involving sponsors and vendors can provide financial and organizational support to your environmental efforts and sends a valuable signal to suppliers that environmental issues are important to your organization. Approach your vendors, such as beverage providers, serviceware suppliers, or waste haulers, and ask them to become sponsors as well. Also consider whether your existing sponsors might be interested in your composting initiative; many sponsors want to help expand recycling and composting in exchange for brand visibility (such as branding recycling or compost containers). Partners might contribute funding, advertisements, and products to your greening effort. Collaboration with sponsors and vendors can also help disseminate information about your greening program into the community.

In 2010, the **Seattle Seahawks/Sounders FC** launched a fan education campaign on compost and recycling programs that encourages fans to leave beverage cups, food trays, napkins, and unconsumed food in the seating area so staff can collect and sort items and minimize contamination for the compost program. "Our strategy for education was about good signage on the waste and compost bins," said Darryl Bengé, former assistant general manager at First & Goal Inc. (operator of CenturyLink Field). "We also worked with our promotions department to make sure we had good PSAs that were featured on the video boards during games about what bins to use. We're fortunate that 80 to 90 percent of our fan base is season ticket holders. So they learn once and remember at future games."

[LEARN MORE](#) NRDC Game Changer, CenturyLink Field case study, [www.nrdc.org/game-changer](http://www.nrdc.org/game-changer)

## COMPOSTING, RECYCLING, AND “ZERO WASTE”

A composting initiative should ideally be part of a comprehensive waste management program that incorporates recycling, waste reduction, reuse, and smart procurement decisions. The materials that make up your facility’s waste are not homogeneous; nearly all of them have some material or nutrient value, which can equal economic value. In order to maximize the environmental and economic benefits of discarded materials, it’s important to reconceptualize “waste” as usable materials and institute procedures to collect and process each of those materials for marketing. In a stadium or arena, you first need to determine what kinds of discards you are producing, and then determine the best ways to collect those materials to maximize their environmental and economic value.

Most of the materials found in municipal solid waste streams yield the greatest environmental benefits when recycled or composted, rather than landfilled or incinerated. In recycling and composting, materials are returned to the production or nutrient cycle, where they displace the use of virgin materials and reduce associated energy use, water use, and water and air pollution, including the pollution that is driving climate change. Most of these materials can theoretically be recycled or composted more than once, resulting in natural resource savings each time. Materials can be converted to energy only once, so for most materials discarded, maximizing recycling and composting is the best way to maximize the ecological benefits associated with those materials.

In addition to developing comprehensive recycling programs, many organizations are instituting “zero waste” policies. If you are considering or have such a policy, it’s important to define what you mean by “zero waste” to ensure transparency of your efforts and protect your organization from criticism. In a “zero waste” framework, the “three Rs” hierarchy should be followed: First reduce waste, then reuse or repurpose materials, and then recycle or compost any materials that remain. “Zero waste” also includes thinking about the eventual disposal of a product when deciding what to purchase, by choosing products and packaging that can be recycled or composted. Another important aspect of “zero waste” is buying products with recycled content, in order to support production systems that use recovered materials as feedstock.

Finally, “zero waste” is aspirational. That is, it is generally unrealistic to expect to send absolutely no waste whatsoever to landfill. But the process of striving for zero waste leads to creative solutions for waste reduction, and to the essential reconceptualizing of waste as useful material, all of which offers the potential for the greatest ecological and economic gain.



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The **Philadelphia Eagles** worked with their concessionaire, ARAMARK, to develop and expand their composting initiative by incorporating back-of-house organic waste collection and by procuring compostable serviceware. “The general managers at ARAMARK are really into our greening work; they feel part of it and take ownership of it, which is awesome,” said Don Smolenski, president and former COO. “They’re always out looking for new products and opportunities.”

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MORE

NRDC Game Changer,  
Philadelphia Eagles case study,  
[www.nrdc.org/game-changer](http://www.nrdc.org/game-changer)

The **Seattle Mariners** engage fans with their BASF Kid Compost Trivia Game, which asks fans to text a response to an environmentally themed question at the end of the first inning. After the seventh inning, one fan who has texted in the correct answer is awarded prizes such as autographed baseballs.

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case study, [www.nrdc.org/game-changer](http://www.nrdc.org/game-changer)



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## ADDITIONAL RESOURCES

To learn more, check out the waste and composting strategies in the NRDC Greening Advisor ([www.greensports.org](http://www.greensports.org)) and in NRDC's *Game Changer* ([www.nrdc.org/game-changer](http://www.nrdc.org/game-changer)) and *Collegiate Game Changers* ([www.nrdc.org/sports/collegiate-game-changers](http://www.nrdc.org/sports/collegiate-game-changers)) reports. Learn more about the NRDC Sports Project at [www.nrdc.org/sports](http://www.nrdc.org/sports) and @NRDCGreenSports.

Also, consider joining the Green Sports Alliance ([greensportsalliance.org](http://greensportsalliance.org)) to share better environmental practices with other teams and venues.

U.S. Composting Council:  
[www.compostingcouncil.org](http://www.compostingcouncil.org)

USCC Compostable Plastics Task Force:  
[www.compostingcouncil.org/compostable-plastics-task-force](http://www.compostingcouncil.org/compostable-plastics-task-force)

FindAComposter.com:  
[www.findacomposter.com](http://www.findacomposter.com)

U.S. Environmental Protection Agency,  
Municipal Solid Wastes in the U.S.:  
[www.epa.gov/osw/nonhaz/municipal/msw99.htm](http://www.epa.gov/osw/nonhaz/municipal/msw99.htm)

U.S. Environmental Protection Agency, WasteWise Program:  
[www.epa.gov/wastewise](http://www.epa.gov/wastewise)

U.S. Environmental Protection Agency,  
Food Recovery Challenge:  
[www.epa.gov/foodrecoverychallenge](http://www.epa.gov/foodrecoverychallenge)

American Society for Testing and Materials:  
[www.astm.org](http://www.astm.org)

Biodegradable Products Institute:  
[www.bpiworld.org](http://www.bpiworld.org)

Feeding America:  
[www.feedingamerica.org](http://www.feedingamerica.org)

Rock and Wrap It Up!:  
[www.rockandwrapitup.org](http://www.rockandwrapitup.org)



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### Endnotes

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- 11 Ibid.
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**Bob Nutting, Chairman of the Board,  
Pittsburgh Pirates:**

"The Pittsburgh Pirates composting program is one of the most extensive and successful in Major League Baseball. We know from firsthand experience that there are ongoing challenges related to designing and implementing a successful composting program at a stadium. *Guide to Composting in Stadiums* is a valuable and timely resource for teams and venues interested in growing their waste diversion programs through composting. The Guide covers everything you need to know to develop or expand an effective organics recycling program, as well as offering numerous examples of successful organics management by sports teams and venues."

**Scott Jenkins, Stadium General  
Manager, AMB Sports &  
Entertainment Group:**

"Waste diversion is the single most visible environmental initiative that any sports venue can undertake. Adopting a composting program has proven to be quite successful thanks to recent advances in packaging, compostable serviceware, and the growing availability of commercial composters. This guide is a valuable resource that will help us view our waste stream as a resource and make composting a normal part of stadium operations."

**Doug Behar, Vice President, Stadium  
Operations, Yankee Stadium:**

"As a stadium committed to keeping food waste out of landfills and moving towards zero waste, we know that composting is essential. *Guide to Composting at Stadiums* provides the type of valuable guidance that we've benefited from at Yankee Stadium and I encourage all my colleagues who operate sports venues to review it. It will surely help you enhance your waste management program."

**Justin Zeulner, Senior Director –  
Sustainability, Portland Trail Blazers:**

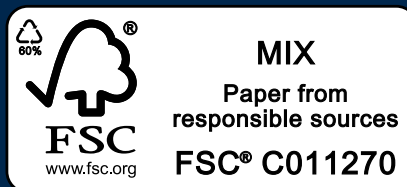
"The Portland Trail Blazers are one of the most progressive environmental stewards in the sports industry and we owe a great deal of our success to our collaborations with the Natural Resources Defense Council and the Green Sports Alliance. In arenas and stadiums like our Moda Center, effective leadership of food and beverage operations is vital to mitigating our environmental footprint. In addition to more sustainable procurement practices, food waste composting furthers our ability to meet our organization's waste diversion goals. This important guide will help all stadiums and arenas do the same."

**Matthew Cotton, Instructor,  
U.S. Composting Council and  
SWANA Composting Courses:**

"*Guide to Composting at Stadiums* provides everything you need to start a successful organics collection program at your stadium (or any large sporting event). It covers all the key decision points from conducting a waste audit to working with composters and getting fans involved."

**Brad Mohr, Assistant Director  
of Ballpark Operations,  
Cleveland Indians:**

"The information in this NRDC composting guide is clear, complete and most importantly applicable to any public assembly facility wanting to start or enhance an organics waste program. The strategies are laid out in a logical, easy to implement format backed up with success stories and eye opening statistics. This guide will convince any stadium operator that an organics program should be a vital component of their waste efforts and prove to be a budget saver. NRDC has consistently demonstrated just how critical our waste streams are and the influence sport has to change minds and behaviors of the public. That drive and spirit are continued here in this valuable resource."



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