

## Overview: Solid Waste Management in Massachusetts

### Introduction

The face of solid waste management in Massachusetts has changed dramatically over the last several decades. Before 1990, almost all trash was disposed of in more than 150 landfills and nine “municipal waste combustors” (which burn trash and generate some electricity). Most of the landfills were owned and operated by municipalities. They generally lacked liners and modern controls for the leachate and gas produced as the waste decomposes. Only small quantities of waste were being recycled. Today, Massachusetts has a modern solid waste management system that promotes waste reduction and recycling, and ensures that facilities that handle and dispose of waste are properly designed and operated.

In 1990, Massachusetts adopted its first Solid Waste Master Plan, a blueprint for managing solid waste that is generated, reused, recycled, recovered and disposed in the Commonwealth. Since then, efforts by citizens, businesses, and state and local government have led to a 47% recycling rate overall, which is among the best in the nation. Our solid waste management facilities have installed modern pollution control equipment and adopted operating practices that minimize their environmental impact. However, waste generation continues to increase while the growth in recycling has leveled off, and we continue to dispose of materials that have significant value.

Dramatic increases in energy costs, heightened concerns about climate change, renewed interest in more efficient use of waste as second-hand materials, and diminishing public resources are prompting the Department of Environmental Protection (MassDEP) to fundamentally reexamine the way we think about solid waste management. A new Master Plan needs to take advantage of new market opportunities and provide a framework for improving the overall environmental performance of our solid waste management system.

This set of fact sheets describes the Massachusetts solid waste management “system”, the wastes that we generate, the facilities that manage these wastes, and the Commonwealth’s waste reduction and recycling programs.

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- [How is Solid Waste Regulated in Massachusetts?](#)
- [What Happens to the Material We Discard?](#)
- [MassDEP Waste Reduction Programs](#)
- [Glossary](#)

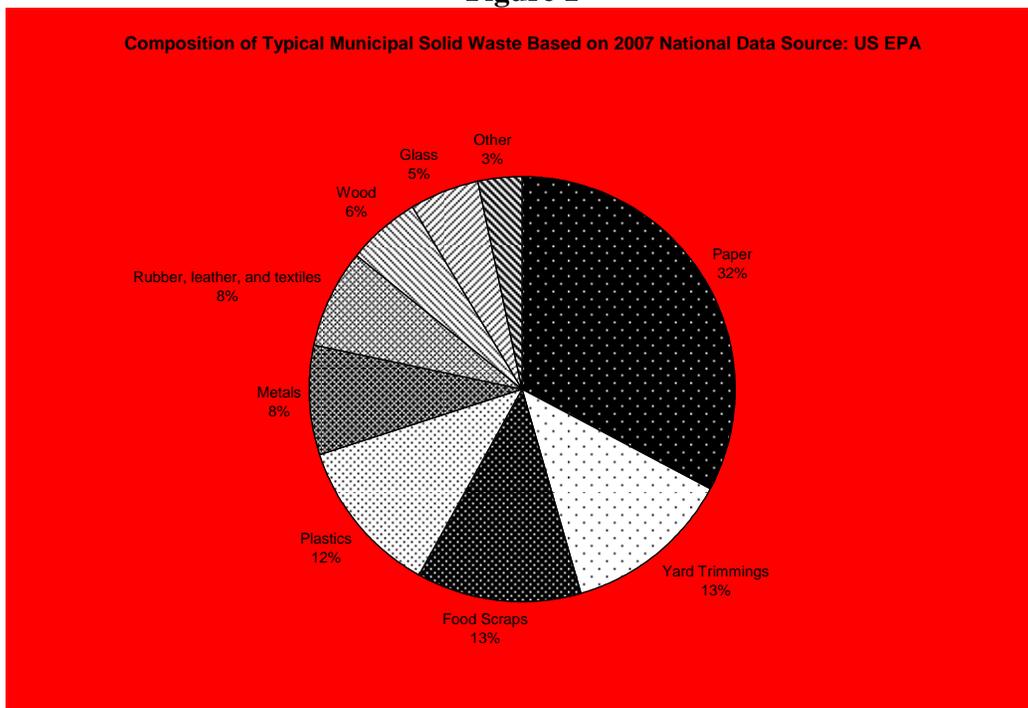
## What is “Solid Waste” and How Much Does Massachusetts Produce?

Solid waste has two major components that are described in these materials: The first (and largest) component is municipal solid waste or trash generated by residents, businesses, institutions and municipalities (not including hazardous waste and other industrial by-products). The second is debris generated by building construction and demolition work.

*Municipal solid waste* (“MSW”) typically contains a wide variety of discarded materials, such as food scraps, yard wastes, paper and paperboard products, plastics, metal, rubber, leather, textiles, wood, glass, and other miscellaneous materials.<sup>1</sup> Figure 1 describes the typical contribution of each of these materials to the waste stream, based on national data.

While households and businesses across the country generally produce the same kinds and proportions of wastes, Massachusetts’ waste may contain slightly higher or lower proportions of some materials. For example, glass and plastic bottles used for soda and other carbonated beverages are usually recycled due to the Massachusetts Bottle Bill, so Massachusetts waste may contain a lower percentage of glass and plastic than other states’ waste. Also, there may be regional variations in the quantities and timing of leaf and yard waste produced, due to differences in vegetation around the country. In general, MassDEP believes that municipal solid waste generated in the Commonwealth is not significantly different than what is generated nationally.

**Figure 1**



<sup>1</sup> Source: US EPA web site: <http://www.epa.gov/osw/nonhaz/municipal/msw99.htm> (the most recent data available at this site describes the composition of waste in 2007).

Table 1 describes how generation of municipal solid waste has grown considerably in Massachusetts since 2000. Generally, MSW generation increases in good economic times, and grows more slowly when the economy slows down.

**Table 1  
Massachusetts Municipal Solid Waste Generation (Tons)**

<b>Source</b>	<b>2000</b>	<b>2002</b>	<b>2004</b>	<b>2006</b>	<b>Change 2000-2006</b>
Residents	3,130,000	3,300,000	3,510,000	3,490,000	360,000
Businesses	4,860,000	5,050,000	5,210,000	5,660,000	800,000
Total MSW Generated	7,990,000	8,350,000	8,720,000	9,150,000	1,160,000
% change in total generation over the previous two years		5.4%	6.4%	4.3%	14.5%

*Construction and demolition debris* (“C&D” waste) are wastes produced by constructing new buildings, renovating old buildings, and demolishing structures, roads and bridges. These wastes typically include asphalt, brick, concrete, metal, wood, wallboard and plaster, roofing materials, and building siding (wood and asphalt shingles and other materials). Wood waste can be painted or stained, unpainted or untreated, pressure-treated, or “engineered” (e.g., particle board), and can take the form of discarded pallets and crates.

Table 2 describes the recent growth in construction and demolition wastes. This growth rate is heavily influenced by the health of the real estate market, which was very robust since 2000, but started to slow down in 2006 and is currently experiencing a variety of economic difficulties.

**Table 2  
Massachusetts Construction and Demolition Debris Generation (Tons)**

<b>2000</b>	<b>2004</b>	<b>2005</b>	<b>2006</b>
4,480,000	5,290,000	5,100,000	4,650,000
% change over the previous two year period	18%	(3.6%)	(8.8%)

In 2006 Massachusetts generated a total of 13.9 million tons of municipal solid waste (MSW) and construction and demolition (C&D) debris.

*Other wastes:* There are other types of non-hazardous waste that are produced in our society, including include non-hazardous industrial wastes and sludges, sewage sludge, junked cars, contaminated soil, medical wastes, and dredge spoils. While these materials can be produced in large quantities in a typical year, they are usually managed at specific facilities and not disposed of as municipal solid waste. For example, “end of life” vehicles are crushed and shredded; the resulting steel is shipped to Asia for recycling and residual material is used for daily cover at landfills. Because these materials are generally managed outside of the major solid waste streams, they have not been a major focus of the Massachusetts Solid Waste Master Plan.

### **How is Solid Waste Regulated in Massachusetts?**

In general, Massachusetts laws and regulations have been designed to ensure that our waste handling and disposal facilities are located on sites that are suitable for these activities, are properly designed, and safely operated. Massachusetts does not regulate or require recycling, except as noted below. Nor does the Commonwealth regulate businesses that collect and haul solid waste from generators to handling and disposal facilities.

*Federal Solid Waste Law: Resource Conservation and Recovery Act (42 U.S. Code §6901 et. seq.)*

In 1976, the U.S. Congress passed the Resource Conservation and Recovery Act (RCRA), which established a national framework for the management of non-hazardous solid wastes (including environmental standards for disposal facilities). This law also established a “cradle to grave” management system for hazardous wastes. States are required to adopt and implement standards for their solid waste facilities that are at least as strict as the federal requirements.

#### *Massachusetts Solid Waste Laws*

In 1955, regulation of solid waste disposal activities at Massachusetts landfills and incinerators began with the enactment of General Law Chapter 111, Section 150A. This law authorized local boards of health to “assign” or approve sites for solid waste disposal facilities (landfills and incinerators) before they were built. In 1971, MassDEP promulgated its first solid waste regulations (310 CMR 19.000), establishing permit and operational requirements for solid waste facilities.

In 1987, the *Solid Waste Act* (Chapter 584 of the Acts of 1987) substantially revised Chapter 111, Section 150A and added a new Section 150A ½ to establish specific criteria for siting solid waste facilities. The Act also established a new chapter of the Massachusetts General Laws (Chapter 21H) and a bond fund to provide financial assistance to cities and towns for closing and cleaning up old unlined landfills, to build environmentally sound solid waste facilities, and to promote recycling and regional solid waste planning. It also required MassDEP to prepare a Solid Waste Master Plan (see Chapter 16, Section 21), and established requirements for “refuse burning facilities” to monitor their emissions of specific hazardous constituents. In 1990, MassDEP promulgated site assignment regulations, (310 CMR 16.00) and modernized the

environmental and other performance standards of 310 CMR 19.000. MassDEP has since revised both 310 CMR 16.00 and 310 CMR 19.000.

The *Beverage Container Recovery Law* was approved by voters in 1982 (60% in favor, 40% opposed). Also known as the “Bottle Bill”, this law requires bottlers and distributors of carbonated and malted beverages to place a \$0.05 deposit on every container sold to retailers (stores) in Massachusetts. Retailers collect the \$0.05 deposit from their customers, for each container purchased. When consumers return empty containers, their deposit for each is returned. Stores and redemption centers that collect the containers return them to the beverage distributors or their agents and collect \$0.05 plus an additional \$0.0225 “handling fee”. If a container is not returned, the \$0.05 deposit is turned over to the Commonwealth’s General Fund.

By providing an economic incentive for consumers to return used beverage containers, to the Bottle Bill drives the conservation of materials and energy through recycling and reuse. The Law has had a dramatic effect on litter abatement and reminds the public about the importance of recycling. Currently, about 66% of all beverage containers sold with a deposit are recovered through the system. While additional containers are recovered through existing curbside and drop-off municipal recycling programs, MassDEP does not have data on the quantities recovered through these programs. See: <http://www.mass.gov/eea/agencies/massdep/recycle/reduce/bottle-and-can-recycling.html>

In 2006, the *Mercury Management Act* (Chapter 190 of the Acts of 2006) was enacted to remove products containing mercury from the waste stream and to minimize the amount of mercury released into air and water from solid waste disposal facilities. This law is the first in Massachusetts to make product manufacturers responsible for collecting and recycling “end of life” mercury products and components that are sold or distributed in the Commonwealth. See: <http://www.mass.gov/eea/agencies/massdep/toxics/sources/mercury.html>

#### *Solid Waste Facility Site Assignment Regulation*

MassDEP’s site assignment regulations require any new or expanded solid waste facility (e.g., landfill, incinerator, waste processing facility or transfer station) to obtain a site suitability determination from MassDEP before a site assignment can be issued by the local board of health. The regulations establish minimum distances or “setbacks” from sensitive receptors and resources (e.g., residences, drinking water supplies, rivers, agricultural land and wetlands, wildlife, and nearby Areas of Critical Environmental Concern) and promote integrated solid waste management. Ultimately, the municipal board of health is the final decision-maker for a site assignment, but its decision can be appealed to Massachusetts Superior Court.

The site assignment regulations exempt small recycling operations (if they handle less than 100 tons per day) and small leaf and yard waste and agricultural composting operations that accept pre-sorted recyclables (i.e., not mixed with other waste), as long as these facilities register with MassDEP and meet certain conditions that ensure that they present little risk of nuisance or other potential problems. In addition, the regulations

include a “Determination of Need” or “DON” process through which MassDEP may decide that a site assignment is not required for recycling and composting operations that will handle more than 100 tons of pre-sorted material per day or are otherwise outside the scope of conditionally exempt operations. An application for a DON must include descriptions of what the operation will recycle or compost, and how the materials will be managed, and must also demonstrate that there is a market available for the recyclable or compostable materials.

#### *Regulations Governing Solid Waste Facilities*

MassDEP’s solid waste regulations (310 CMR 19.000) establish permit requirements for solid waste landfills, municipal waste combustors (governing the management of solid waste at these facilities), and handling facilities (i.e., facilities that are required to obtain a municipal site assignment before they can be built). The regulation establishes stringent standards for design, operation, and monitoring, and requires that project owners provide financial assurance that funds are available for proper closure of the facility at the end of its life. MassDEP issues permits for facilities in two steps:

- First, MassDEP issues an Authorization to Construct (ATC), which allows construction of the facility, based on a detailed engineering review of plans.
- Once the facility construction is complete, MassDEP issues an Authorization to Operate (ATO), demonstrating that the facility has been constructed in accordance with the approved plans and that all other requirements, such as financial assurance, have been met.

In addition, landfills and municipal waste combustors are also required to obtain separate MassDEP approvals of their plans for managing their emissions of air pollutants, which are regulated by MassDEP’s Air Quality Regulations (310 CMR 7.00). Once they receive approval of these plans, the facilities are required to monitor their air emissions during operations, and to submit periodic reports on emissions of specific pollutants to the Department.

#### *Beneficial Use Determinations*

In general, solid waste must be handled and disposed of at solid waste management facilities that hold site assignments and MassDEP permits, or recycled or composted at facilities that are conditionally exempt from MassDEP regulation. However, some solid wastes can be beneficially used for purposes that may not qualify as recycling or composting. Therefore, MassDEP’s solid waste regulations (310 CMR 19.060) provide another mechanism for managing solid waste materials, by allowing discarded materials to be re-used.

The Beneficial Use Determination (BUDs) regulations allow a proponent to demonstrate to MassDEP that a solid waste material can be used in one of four types of situations, and can meet the appropriate risk-based standards:

- Commercial Products, such as bricks and concrete (Category 1);
- Regulated Systems, which use material in or at a facility that is already regulated by MassDEP such as a landfill (Category 2);

- Restricted Applications at a specific location or in a specific application where the exposure to the material exposure can be controlled or limited, such as a roadway or at a construction site (Category 3); and
- Unrestricted Applications, such as use at a residential property or on agricultural fields.

Risk standards have been developed for each category based on the potential for people to be harmfully exposed to the material. Therefore, the most stringent standards apply to BUDs for Unrestricted Applications because the material can be reused with few, if any, restrictions, and the potential for exposure to potentially harmful constituents is high, while a BUD for a Commercial Product would allow the use only in a very specific product where contaminants, if present, would present little opportunity for exposure.

#### *Waste Bans*

To preserve disposal capacity at Massachusetts solid waste facilities, to encourage recycling and composting, and to reduce the toxicity of the waste stream, MassDEP included a provision in 310 CMR 19.000 when it was first promulgated in 1990 that banned specific materials from disposal or transfer for disposal (310 CMR 19.017). Transfer stations and disposal facilities are required to establish plans to ensure that banned materials are separated from trash and are not disposed of. Generators and haulers are not allowed to contract for disposal of banned materials. Materials covered by the 1990 ban are:

- lead acid batteries
- leaves and other yard waste
- tires
- white goods
- aluminum, metal and glass containers
- single polymer plastics
- recyclable paper

In 2000, the waste ban regulation was extended to cathode ray tubes (found in televisions and older computer monitors and other electronic equipment). In 2005, the ban was extended further to specific types of construction and demolition debris: asphalt pavement, brick, concrete, metal and wood. See:

<http://www.mass.gov/eea/agencies/massdep/recycle/solid/massachusetts-waste-disposal-bans.html>

#### *Products Containing Mercury*

In 2007, MassDEP promulgated the first regulations to implement the Mercury Management Act (310 CMR 74.00 and 75.00). These regulations established specific requirements for the removal of mercury switches from “end of life” cars and trucks, and mercury lamp manufacturers’ public education plans. In addition, the regulations established performance standards for “end of life” mercury product collection and recycling programs that manufacturers are required to implement for mercury products they sell or distribute in the Commonwealth. In October 2008, MassDEP proposed additional regulations that would establish a process for manufacturers to obtain an

exemption from the statute’s ban on the sale of certain mercury products, as well as requirements for labeling mercury products and implementing the ban on disposal of these products in trash.

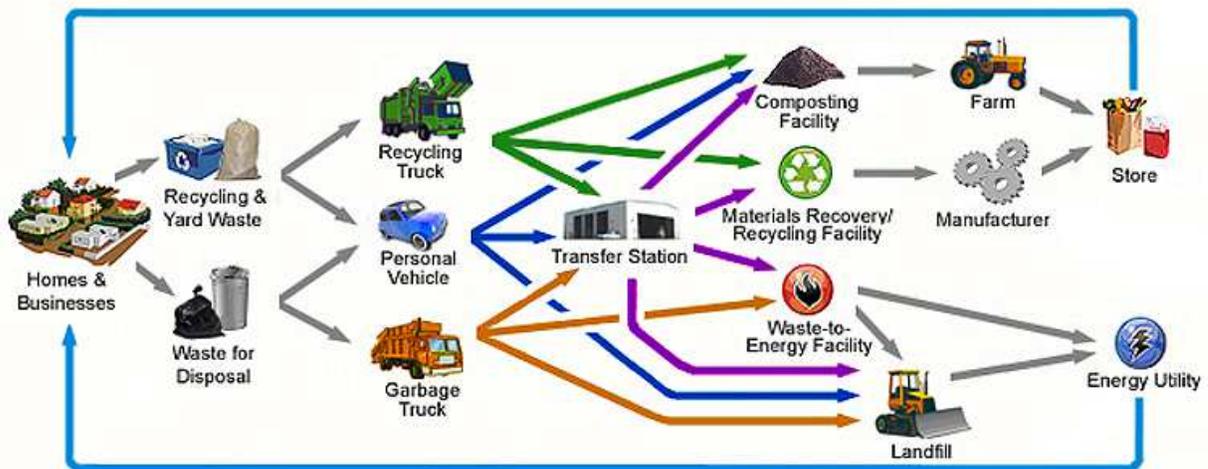
### What Happens to the Material We Discard?

Managing solid waste involves two or three basic steps:

- materials are *collected* from the generator (e.g., residents, businesses, schools, municipal buildings, institutions, etc.),
- materials that can be recycled are *sorted* (and frequently baled) into homogenous stocks, and may be *processed* to make them suitable for a new use , and
- materials are *used* as feedstocks to replace virgin materials in the manufacture of new products or are *disposed of* in a landfill or municipal waste combustor.

Massachusetts’ solid waste may have several destinations before it is ultimately disposed, as described the figure below.

Figure 2



Material that is discarded in Massachusetts can be:

- “diverted” from disposal, to be re-used, recycled, composted, or used to generate energy (for example, wood from construction and demolition projects is separated from waste and sent to “biomass” energy generation facilities where it is burned to produce electricity), or
- disposed of at municipal waste combustors (facilities that burn waste and generate small amounts of electricity) and landfills.

Table 3 describes the quantities of Massachusetts waste that were diverted from disposal and that were disposed in 2000 and 2006. This data includes both MSW and C&D debris.

<b>Table 3</b>				
<b>Solid Waste Management 2000-2006 (Tons)</b>				
	<b>2000</b>	<b>2006</b>	<b>Tons Change</b>	<b>% Change</b>
<b>Generation</b>	12,660,000	13,890,000	1,230,000	9.72%
<b>Diversion*</b>	6,200,000 (49% of waste generated)	7,340,000 (53% of waste generated)	1,140,000	18.39%
<b>Disposal</b>	6,460,000 (51% of waste generated)	6,550,000 (47% of waste generated)	90,000	1.39%

\* Please note: "Diversion" includes discarded materials that are reused and recycled, as well as wood burned in biomass energy facilities, and C&D residuals used for daily cover and grading/shaping material at landfills.

Collecting Discarded Materials

- In Massachusetts, most municipalities provide some type of solid waste management services to residents of single family homes and small multi-family buildings (usually with fewer than four or six units, depending on the municipality).
- Most commercial waste is managed by the businesses (usually through a contract that the business or building manager establishes with a trash hauler), although a few municipalities offer solid waste services to some (generally small) businesses.
- At building construction and demolition projects, the contractor typically arranges for waste collection by a private hauler as part of the project.

Residential trash and recyclables are handled in a variety of ways by cities and towns in Massachusetts. While not required by law to provide solid waste management services to their residents, most municipalities contract with waste companies to serve their residents, either by collecting materials at the curb or by providing a location where residents (and in some cases, businesses as well) can drop off materials. In municipalities that do not provide these services, residents must manage their own recyclables and trash through private contracts with haulers.

Table 4 describes how solid waste services were provided to residents by municipalities in 2006.

**Table 4**  
**Municipal Solid Waste Services for Residents (2006)**

<b>Service</b>	<b>Curbside Collection</b>	<b>Drop-off Facility</b>	<b>Private Subscription</b>
Recycling Collection	163 municipalities 4,960,000 population	169 municipalities 1,200,000 population	19 municipalities 190,000 population potentially served*
Trash Collection	166 municipalities 4,970,000 population	150 municipalities 1,060,000 population	35 municipalities 320,000 population potentially served

\* Solid waste haulers may offer to collect recyclable materials from residents, or may offer this service at an additional charge with trash collection. In municipalities that rely on privately subscribed services, many residents decline to pay to have their recyclables collected and do not recycle.

Most municipalities that provide curbside collection of recyclable material and trash contract with private waste management firms for these services. A few municipalities (20-30) use their own workers and trucks to collect recyclable materials and/or trash.

Municipal programs vary widely in their details (frequency of curbside recycling collection, drop-off hours of operation, and the range of recyclable materials or bulky waste accepted). They also vary in how they are funded.

Some municipalities fund the entire cost of trash and recycling services (curbside or drop-off) out of their general fund (e.g. property tax receipts). Others fund it with a direct assessment paid by residents and/or business. Some use a combination of general fund and direct assessments. This approach may use an incentive-based fee system where residents pay on a per-unit basis (e.g. bag or barrel) for trash collection and disposal and receive unlimited recycling without a fee. This is known as a “Pay As You Throw” or “PAYT” system.

- 124 municipalities (with a total population of 1,550,000) have adopted a PAYT approach that serves some or all of their residents. There are several variations of PAYT programs operating in Massachusetts municipalities: some allow residents to dispose of one container of trash without paying but charge for disposal of additional containers; others charge for all waste disposal. Through their economic incentives, PAYT programs have been very successful in increasing the rates at which residents recycle their discarded materials, and in reducing the quantities of waste that need to be disposed of.

Traditional residential recycling collection technology:

- *Dual Stream:* Until recently, curbside recycling programs required residents to sort their materials into two categories or streams: paper and comingled containers.. “Paper” includes cardboard, mail, catalogues, magazines, and newspaper. Containers include plastic, glass, and metal food, beverage and household product containers.

The two streams are kept segregated in the recycling truck and are transported to a *Materials Recovery Facility* (MRF) where they are sorted through a combination of manual and mechanical separation into separate streams of glass, ferrous metal (steel cans), non-ferrous metal (aluminum cans), plastics (according to resin types, such as #1 and #2). Materials are then baled and sold to commodity markets for use in manufacturing new products.

- *Single Stream*: Single stream recycling made its debut on the west coast about 10 years ago, but only arrived in Massachusetts in 2006. With single stream, residents place all recyclables (paper and containers) into one bin. The mixed materials are then sent to a single stream MRF where sophisticated sorting technology separates the paper from the containers. The container stream is sorted into the separate commodity streams as described above. Approximately 30 Massachusetts municipalities (24 curbside and 7 drop-off) have converted to single stream recycling from dual stream in the past 12 months, and more are planning the conversion.

New collection technology: Another industry trend emerging in Massachusetts is automated or semi-automated collection of trash and/or recyclables in curbside programs. Automated collection refers to the process where residents are provided with specially designed carts that are emptied by an automated vehicle. This vehicle uses a mechanical arm to pick up the cart and dump the contents. Carts range in size from 32 to 95 gallons, with most communities using 64 or 95 gallon carts. In a semi-automated collection program, the driver or attendant manually positions the cart for the lift-arm and pulls a lever to tip the cart.

Some communities in Massachusetts have converted to a two-cart system; one for trash and one for mixed (single stream) recyclables. Others are using a cart system for single stream recyclables only, while residents use traditional trash cans for waste. And in some, trash is collected in a cart, and recyclables in the traditional dual stream method with curbside “blue bins.”

#### *Other Materials*

Some materials never enter the waste “stream”, but are taken by their generators directly to a facility that sends them to be recycled. For example, as a result of a five cent deposit that we pay for each bottle and can containing a carbonated drink, many people return their empty bottles and cans to stores or to “redemption centers” that in turn send the collected bottles and cans to facilities that recycle them into other materials. Between July 1, 2006 and June 30, 2007, the deposits on 1,452,600,000 (66%) of the 2,209,000,000 redeemable containers that were sold were redeemed. Deposits on the remaining 756,464,000 containers were not redeemed (some of these containers may have been recycled through municipal recycling programs; others were discarded in trash). The unredeemed deposits that had been paid when the containers were purchased contributed \$37,823, 229 to the Massachusetts General Fund during this period.

How are Recycled Materials Used?

In 2006, Massachusetts diverted 7.34 million tons of discarded materials from disposal, about 53% of solid waste generated in that year. Recyclable material may be taken to “materials recovery facilities” or other types of handling facilities, which package loads of sorted recyclable material and ship them to businesses that incorporate the material into new products. Some materials (such as plastic) need to be “processed” further to reduce their volume and toxicity and to prepare them for a manufacturing process before they can be shipped to a new user. For example, large metal appliances have their toxic components removed so they can be disposed of properly, and are then shredded into small pieces which are generally shipped to Asia for reuse in new steel.

There are more than 334 recycling programs across the state that collect a wide range of materials. This is made possible with the help of more than 1,400 Massachusetts businesses that collect, process or use these materials to manufacture new products. Some material is ultimately shipped out-of-state or overseas to be incorporated into new products. Table 5 describes the types of products that are made at least partly from recycled materials.

**Table 5**  
**Examples of**  
**What Happens to Massachusetts’ Recycled Materials**

<b>Material</b>	<b>Recycled into...</b>
Office paper	Office paper and various paper products
Newspapers, magazines, junk mail and mixed paper	Cereal and cracker boxes, book covers and game boards
Boxboard and corrugated cardboard	Cardboard
Aluminum cans	Cans, rain gutters, and window frames
Steel cans	Steel cans, bicycles, paper clips, steel beams, and other steel products
Plastic soda bottles	Polyester fleece and carpet
Milk jugs, detergent bottles and other plastics	Plastic lumber and decking
Margarine & yogurt tubs and lids	Floor tiles, garbage cans, and pallets
Glass	Glass bottles and jars
Electronics	Refurbished electronics, plastics, and metals

Many of the materials listed in Table 5 are banned from disposal by MassDEP regulation. See: <http://www.mass.gov/eea/agencies/massdep/recycle/solid/massachusetts-waste-disposal-bans.html>

### *Beneficial Use of Industrial Waste Materials*

Industries sometimes produce waste materials that can be safely and profitably re-used in other industrial applications.

Since October 2005, when the Beneficial Use Determination (BUD) regulations were revised, 72 BUDs have been issued. Most (60) cover the use of waste material at specific locations, and twelve apply to specific wastes and uses statewide:

- Regulated Systems (Category 2): 47 BUDs have been issued for a variety of applications, including residuals from processing construction and demolition debris at landfills for daily cover or contour material, short paper fiber mixed with soil and used as vegetative cover material at landfills, and residuals from drinking water treatment facilities that are used to fill and grade roads at properties owned or operated by municipal drinking water facilities.
- Restricted Applications (Category 3): 22 BUDs have been issued. Examples include the use of coated or painted asphalt, brick and concrete that is used as fill material in the construction of buildings, roadways, and parking lots; street sweepings used to reclaim gravel pits, and asphalt roof shingles used in the construction of roads.
- Unrestricted Applications (Category 4): Three BUDs have been issued, all for the use of clean (i.e., unpainted and untreated) wood from construction and demolition debris to make mulch for landscaping.

To date, MassDEP has not issued any BUDs for commercial products (Category 1) since October 2005. Projects in this category could include the use of foundry sand in concrete products (e.g., stairs, foundations, and barriers). Some activities that could be considered Category 1 BUDs may also be regulated as “recycling” activities, and may not need to obtain a BUD approval.

MassDEP inspects businesses that hold BUDs to ensure that the terms of the approval are being complied with. Between October 1, 2007 and September 30, 2008, MassDEP staff conducted eight inspections, and issued three Notices of Noncompliance and two Orders to correct specific problems observed.

### *Recycling and Re-use of Construction and Demolition Debris*

Some types of construction and demolition debris have been recycled for many years. For example:

- Discarded asphalt, concrete, and bricks are usually ground up and used underneath new buildings and roads.

- Metal that is discarded at construction projects is also usually recycled into new steel.

Since 1997 (when MassDEP issued a statewide approval), loads of C&D “fines” or pieces of debris no larger than 3 inches in diameter have been used at landfills for alternative daily cover, and for grading/shaping material at landfills that are being capped and closed. In 2001, MassDEP started to allow C&D debris that contained slightly larger pieces (no bigger than 6 inches in diameter) to be re-used at landfills for these purposes. The C&D fines have replaced clean soil that would otherwise have been required. In the late 1990s, wood that has been separated from other debris began to be shipped to a biomass energy generation facility in Maine in the late 1990s, and more recently, has begun to be shipped to a particle board facility in Quebec.

In 2005, MassDEP banned the disposal of asphalt, brick, concrete, metal, and wood from construction and demolition work. This ban took effect in 2006.

Table 6 describes the tonnage of C&D debris that was diverted to recycling and re-use and disposed of in 2000 and 2006.

<b>Table 6</b>				
<b>C&amp;D Debris Management in Massachusetts</b>				
<b>2000-2006 (Tons)</b>				
	<b>2000</b>	<b>2006</b>	<b>Tons Change</b>	<b>% Change</b>
<b>Generated</b>	<b>4,480,000</b>	<b>4,650,000</b>	<b>170,000</b>	<b>3.8%</b>
<b>Diverted</b>	<b>3,800,000</b>	<b>3,930,000</b>	<b>130,000</b>	<b>3.4%</b>
<b>Disposed</b>	<b>660,000</b>	<b>720,000</b>	<b>60,000</b>	<b>9.1%</b>

#### *Facilities that Handle Recyclables and Solid Waste*

There are several types of Massachusetts facilities that handle trash and recyclable materials:

- C&D Debris Processing Facilities – 14 facilities receive, temporarily store, process (usually by sorting, crushing, shredding, screening, etc.), and recover recyclable materials from mixed construction and demolition debris for reuse, sale, or further processing. In 2006, these facilities managed 1.05 million tons of C&D waste.
- Materials Recovery Facilities (MRFs)- seven processing facilities that sort and bale paper, glass, plastic and metal containers before selling them to industries which use the recyclables as feedstock in their manufacturing process. MassDEP paid for construction of the first MRF in Springfield in 1990, and operates it through a contract with a recycling firm. Seventy-eight Western Massachusetts municipalities now contract to deliver their recyclable material from about one million residents to this facility. Between 1990 and 1995, the Commonwealth paid the operator \$7 million to run the facility. In 1995, the operator’s contract was restructured; since then the operator has received income from directly from the sale of recovered materials (neither the municipalities that send material there or the Commonwealth pay for

facility operations). Since it started operating, the Springfield MRF has processed more than one billion pounds of recyclable material. The other six MRFs operating in Massachusetts have all been built and are operated by private entities. In 2006, Massachusetts MRFs handled 483,000 tons of material.

- Recycling Processors – approximately 150 facilities aggregate a variety of source separated materials from MRFs and some commercial large generators, and convert them into materials that are used in manufacturing processes. These facilities process specific materials, such as paper, metals, plastics, asphalt and concrete, or specific product streams, such as electronics. In 2006, these facilities handled 3.98 million tons of material.
- Transfer Stations – 206 facilities receive, temporarily store, and ship loads of recyclables and solid wastes for transport to a MRF, recycling processor or final disposal site (37 are permitted to handle more than 50 tons per day, and 169 are limited by their MassDEP permits to handling smaller quantities). In 2006, Massachusetts transfer stations handled 3.7 million tons of solid waste.
- Composting Operations -- Altogether, 300 sites in Massachusetts accept various types of organic materials including leaf and yard waste, grass clippings, wood wastes, and food waste. The sites include four facilities that compost the organic portions of mixed solid waste, approximately 220 commercial and municipal composting sites that have registered with MassDEP (but do not require a local site assignment), and about 75 agricultural compost sites that are registered with the Massachusetts Department of Agricultural Resources. In 2006, these facilities together managed 589,000 tons of organic materials.

#### *How Does MassDEP Ensure that Recycling and Solid Waste Handling Facilities are Operated Properly?*

MassDEP oversees larger facilities differently than smaller ones. Larger facilities submit periodic reports (required by MassDEP permits), which MassDEP reviews and follows up to ensure that reported problems are resolved. The Department inspects these facilities on a regular basis to ensure that they are complying with their permit requirements. Inspections also cover compliance with waste bans. When MassDEP receives complaints about operations at these facilities, Department staff work with the local Board of Health to resolve issues. MassDEP uses “Notices of Noncompliance” and escalating enforcement actions (which can include fines and penalties) to ensure that the facilities correct violations of Department regulations.

- For example, between October 1, 2007 and September 30, 2008, MassDEP conducted 60 inspections of large transfer stations, and 10 compost facilities that hold site assignments. These inspections led to the issuance of two Notices of Noncompliance and three Orders to correct specific violations.

Smaller facilities (e.g., transfer stations handling less than 50 tons/day, facilities holding “Determinations of Need”, and facilities that are “conditionally exempt” from site assignment) are required to submit fewer reports to MassDEP and are inspected less frequently.

- Between October 1, 2007 and September 30, 2008, MassDEP conducted 11 inspections of “Determination of Need” facilities as a result of concerns raised about their operations. These inspections led to the issuance of two Notices of Noncompliance.

Waste Disposal

In 2006, Massachusetts citizens, businesses, government, and institutions disposed of 6.5 million tons of solid waste in landfills and municipal waste combustors (“MWCs”), located in Massachusetts and out of state. Many municipalities have entered into long-term contracts with specific facilities for disposal of the waste they collect. Other municipalities have contracted with haulers to collect residents’ waste, but allow the hauler to decide which disposal facility to take the waste to – a decision that is usually based largely on the price that the facility charges for the load (or set of loads), and the locations of disposal facilities that the hauler (or its parent company) may own. In this way, waste is treated as a commodity with its own market.

Table 7 shows that, while most (79%) of Massachusetts’ solid waste is disposed at in-state facilities, 21% of our waste was shipped to disposal facilities located in other states in 2006. States that received the largest amounts of Massachusetts waste included Maine, New Hampshire, New York, Ohio, and South Carolina.

	<b>2000</b>	<b>2006</b>
<b>Total Waste Disposed</b>	6,460,000	6,550,000
<b>Landfilled in State</b>	1,760,000	2,080,000
<b>Combusted in State</b>	3,070,000	3,100,000
<b>Net Tonnage Exported to Other States</b>	1,630,000	1,370,000

*Disposal technologies currently in use*

Landfills: There are 17 landfills operating in Massachusetts that accept typical household and business trash and construction and demolition (C&D) debris (although most C&D first goes to a C&D recycling processor). Another six landfills accept primarily ash from municipal waste combustors and incidental quantities of municipal solid waste. Landfills are not allowed to accept hazardous waste and banned recyclable. Landfills must be

located, constructed, operated, and monitored in accordance with state and federal environmental requirements, and also must receive local Board of Health approval of their location.

Landfills are built in phases or cells. In Massachusetts, new landfill cells must have double-liners to prevent water that leaches through the waste from contaminating groundwater. Landfills must collect leachate (rainwater that percolates through the waste), and must implement specific operating practices that protect public health (such as compacting and covering waste frequently with soil to help reduce odor and control litter, insects, and rodents). Landfills also have on-site environmental monitoring systems that provide early warning of groundwater contamination and dangerous levels of landfill gas. Before a landfill (or a new cell) can be built, the owner must have a MassDEP-approved plan to cap the landfill when it is full and to ensure its long-term care, which often includes new uses (e.g., sports fields). These requirements are established in MassDEP's regulations governing Solid Waste Management Facilities. See: <http://www.mass.gov/eea/agencies/massdep/recycle/regulations/310-cmr-19-00.html>

Many Massachusetts landfills collect methane gas (which results from the decomposition of waste) and convert the gas into energy. Plans for collecting gas and for flaring it or generating electricity must be approved by MassDEP under the Air Quality Regulations before the system can be built. Facility owners must submit periodic reports to MassDEP about the operation of these systems and air emissions.

MassDEP reviews environmental monitoring reports that are submitted periodically by active landfills and by landfills that have been closed under a MassDEP permit. When a facility reports a problem, MassDEP follows up to ensure that it is resolved. The Department inspects active landfills on a regular basis, to ensure that they are complying with their permit requirements. Inspections also cover compliance with waste bans. The Department uses "Notices of Noncompliance" and escalating enforcement actions (which can include fines and penalties) to ensure that the facilities correct violations of Department regulations.

- Between October 1, 2007, and September 30, 2008, MassDEP conducted 358 inspections of the operating landfills. These inspections led to the issuance of seven Notices of Noncompliance and eleven Orders to correct specific violations.

In-state capacity for waste disposal at landfills is expected to decline significantly over the next decade as currently active landfill cells are filled and closed. By 2018, nine of the 17 active MSW landfills are expected to close, reducing annual statewide landfill waste disposal capacity to 1.1 million tons, a million tons less than capacity today.

Municipal Waste Combustors: There are seven municipal waste combustors operating in Massachusetts, which together burn just over 3 million tons of municipal solid waste (MSW) each year. Also known as "waste-to-energy" plants, MWCs burn trash at a very high temperature (approximately 2,500° F) and generate electricity or steam power. The combustion process reduces the trash about 90 percent by volume and 75 percent by

weight, and residual ash is buried in landfills. MWCs also recover metals for recycling from their process.

As the result of new air quality regulations that MassDEP adopted in 1998, emission control systems at the five largest Massachusetts MWCs (those handling more than 250 tons of waste per day) were substantially renovated and updated by 2000, and the facilities established “mercury separation plans” for collecting and recycling mercury products before they are burned. These programs help to ensure that the facilities meet stringent limits on their emissions of mercury into the air. Air pollution control equipment at the two smaller MWCs was renovated in the early 2000’s; these facilities are not required to implement mercury separation plans.

MWCs must be operated in accordance with state and federal solid waste and air regulations that ensure that they handle wastes properly at the facility and that their air emissions remain below levels and concentrations that could pose significant risks to public health or the environment. All facilities are required to monitor key air pollutants continuously, and to test other pollutants (primarily “air toxics” such as dioxin and mercury) coming out of their smoke stacks every nine months. The facilities must report the results of these monitoring efforts semi-annually and annually, identify instances in which air quality standards were exceeded, and describe how they corrected problems. Annual and semi-annual emission monitoring reports submitted by the five largest MWCs are posted on MassDEP’s web site. See:

<http://www.mass.gov/eea/agencies/massdep/recycle/solid/municipal-waste-combustors.html>

Six of the seven Massachusetts MWCs produce electricity for the New England electric power grid (One MWC produces steam, which is used by nearby businesses). As of November 1, 2008, these six facilities together can produce up to 222.88 megawatts of electricity per hour (based on their total winter seasonal claimed capacity), or 1.55% of the total winter seasonal claimed capacity of electrical generating plants located in Massachusetts.<sup>2</sup>

Since 1990, the Commonwealth has imposed a moratorium on the construction of new capacity for incinerating waste. The moratorium was originally established to avoid overbuilding in-state disposal capacity with facilities that must receive large amounts of trash for decades. In the “Beyond 2000” Solid Waste Master Plan, the moratorium was also continued, to prevent increased mercury emissions from these facilities.

MassDEP inspects all of the MWCs annually to review solid waste handling; the facilities’ air pollution control equipment is inspected every three years. In fiscal year 2008, these inspections resulted in two Notices of Noncompliance. In addition, Department staff reviews the reports that the facilities submit describing their air emissions, and may observe the periodic tests of emissions from the facilities’ smoke stacks.

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<sup>2</sup> ISO-New England, SCC Report, November 2008.

Co-composting: Both Nantucket and Marlboro operate MSW co-composting facilities. Co-composting involves mixing MSW (after recyclables are removed) with sewage sludge in a composting vessel. Air and water are added to the vessel to optimize biological decomposition (or “digestion”) while the material is held in the vessel for several days. After the material has decomposed, a screening process is used to separate organic materials for further processing as compost (i.e., several weeks of compost curing) from materials not suitable for compost, which are disposed in a landfill. This process can reduce the amount of solid waste disposed by up to 80%.

MassDEP oversees the co-composting facilities as it does other solid waste management facilities, by conducting periodic inspections and (if needed) taking enforcement action when problems are not corrected in a timely way.

#### *Alternative Waste Management Options*

A growing number of other waste management technologies are now being considered worldwide to address MSW. Most require some pre-processing to reduce the size of the MSW feedstock. These technologies have been employed to address MSW in Europe, Japan and other countries, but none currently are operating on a commercial scale in the U.S. The technologies that appear to be of significant interest are:

Anaerobic digestion: Anaerobic digestion occurs when bacteria break down (or “digest”) organic materials in the absence of oxygen. This biological process produces a gas, sometimes called biogas, which is principally composed of methane and carbon dioxide. This gas is produced from feedstocks such as sewage sludge, livestock manure, and wet organic materials (including MSW), and can be used to generate energy. Anaerobic digestion involves putting organic materials, along with various types of bacteria, in an airtight container called a “digester” where the process occurs. Depending on the waste feedstock and the system design, 55% to 75% of biogas is typically methane. The solids remaining after the digestion process can be used as compost, although when MSW is used as a feedstock a small percentage of non-organic residuals will still require disposal. Anaerobic digestion facilities using MSW feedstock currently operate in several European countries and in Israel.

Gasification: Gasification is a chemical process that converts carbon-containing material, such as coal, petroleum coke, or MSW into a synthesis gas that can be used for energy production or as a building block for other chemical manufacturing process. Gasifiers operate at high temperatures (1,400 to 2,500 degrees Fahrenheit) and pressure in an oxygen limited environment. The synthesis gas produced by this process is comprised primarily of carbon monoxide and hydrogen. This gas can be burned to create electricity or steam or converted into usable products such as hydrogen, ammonia, and other chemicals. Inorganic materials (e.g., metals) are converted to either bottom ash or to a solid, vitreous (glass-like) slag. Gasification also can produce a concentrated carbon dioxide stream that may have a significant role in carbon sequestration in the future. Gasification projects using MSW currently operate in several countries,

including Japan and Malaysia. These projects can gasify more than 90% of the MSW they accept, leaving 10% that must be disposed of.

Pyrolysis: Pyrolysis is the thermal decomposition of organic materials into gases, oils, and char. Pyrolysis typically occurs at temperatures in the range of 650 to 1,500 degrees Fahrenheit. Higher temperatures produce mainly gaseous byproducts, and lower temperatures produce more liquid pyrolysis oils. In addition to energy production from the resultant gases and oils, ferrous metals contained in the solid residue (i.e. char) can be captured for reuse. Pyrolysis demonstration projects using MSW feedstock currently are underway in Canada and the U.S. (California). Pyrolysis is anticipated to use more than 90% of the MSW accepted, leaving 10% that must be disposed of.

### **MassDEP Waste Reduction Programs**

MassDEP has focused its waste reduction programs on a variety of source reduction, recycling and reuse efforts. The Department provides assistance in different ways for municipal and commercial waste reduction.

#### **Municipal Waste Reduction**

Before 1990, Massachusetts residents recycled about 10% of their discarded materials. In 1990, MassDEP established bans on disposal of a number of materials for which recycling was feasible. The “waste bans” were phased in over the next five years. See: <http://www.mass.gov/eea/agencies/massdep/recycle/solid/massachusetts-waste-disposal-bans.html>

During this time, many municipalities developed infrastructure to collect recyclable materials (particularly those that are banned from disposal) from residents, and move these materials to companies that reuse and recycle them into new products. MassDEP used a variety of grants and other types of assistance to help municipalities develop these programs, and to encourage residents to use them. By 2006, the statewide MSW recycling rate had reached 37%. MassDEP’s grants and assistance programs are described below.

#### *Residential Waste Reduction Assistance Programs:*

MassDEP uses three primary tools to increase residents’ access to recycling programs and to encourage them to participate: 1) grants and assistance 2) training and 3) outreach/education.

While these tools support a wide range of municipal waste reduction initiatives, they have been increasingly focused on several priority program strategies. These focus areas include development of Pay-As-You-Throw programs, implementation of single-stream recycling and automated collection, implementation of mandatory recycling at the local level, initiatives to increase participation in existing recycling programs (particularly to recycle more paper and cardboard), initiatives to improve collection program efficiency

and savings (through improved contracting and collection systems), and programs to increase safe management of hazardous household products.

Grants and Technical Assistance: MassDEP has implemented a number of programs that have provided many different types of grants and technical assistance for municipal recycling programs. From 1989 until 2003, funds for these efforts were drawn from the Commonwealth’s “Clean Environment” fund, which received unredeemed deposits on bottles and cans. After 2003 (when the Legislature Clean Environment Fund and most other dedicated funds from the Commonwealth’s books), funds have been made available on a year to year basis from the General Fund. Table 8 describes the total annual grant awards that MassDEP provided between 1993 and 2008.

**Table 8**  
**Total MassDEP Municipal Waste Reduction Grants Awarded**  
**1989-2008**

Grant Year*	Total Award
1989	\$ 3,083,930
1991	\$ 977,360
1993	\$ 2,863,610
1994	\$ 1,779,580
1995	\$ 2,832,935
1996	\$ 2,207,620
1997	\$ 1,331,341
1998	\$ 1,190,270
1999	\$ 1,253,164
2000	\$ 1,704,154
2001	\$ 1,368,426
2002	\$ 3,773,304
2003	\$ 451,510
2004	\$ 684,317
2005	\$ 556,371
2006	\$ 600,191
2007	\$ 536,725
2008	\$ 798,537
	\$27,993,345

\*Notes: 1989 grants included funds to start curbside collection of recyclable material in Western Massachusetts, when the Springfield MRF opened. No grants were awarded in 1990 or 1992.

Specific programs are described below:

- Municipal Grants and Technical Assistance: Historically MassDEP has provided equipment to support recycling, composting, household hazardous products (HHP), and mercury diversion programs at the local and regional level. These grants enable municipalities and schools to create a recycling collection infrastructure both in-house (at municipal buildings and schools) and for the community at-large (to serve residents and in some cases businesses). Table 9 describes the grants that MassDEP provided from 1989 through 2008.

**Table 9**  
**What Were MassDEP Municipal Waste Reduction Grants Used For? (1989 to 2008)**

<b>Category</b>	<b>Number of Municipalities Served</b>	<b>Equipment and Services Provided</b>
Public Education	295	19,855,000 pieces of outreach material
Curbside Recycling Trucks	24	77 trucks
Home Composting Bins	251	59,982 bins
CRT Recycling Assistance	151	Recycling CRTs from residents (1999-2002)
Used Motor Oil Collection Tanks	102	109 tanks
Used Paint Collection Sheds	69	175 sheds
Pay-As-You-Throw Start-up Assistance	42	955,000 households
Public Area Recycling Containers	78	8,770 containers
Recycling Roll-off Containers	246	727 roll-offs
School Chemical Management Grants	33	33 schools
Curbside Recycling Bins	211	1,303,000 bins
Technical Assistance for Pilot/Innovative Projects	91	182 projects
Technical Assistance – Coordinators	8	9 coordinators
Technical Assistance – In Kind	117	194 projects totaling 11,580 hours
Transfer Station Improvements	30	13 awards (some regional)
Recycling Transfer Trailers	6	11 trailers
Universal Waste Sheds	97	104 sheds
Wheeled Recycling Carts	102	10,700 carts
Yard Waste Shredders	4	4 shredders
Municipal Composting Site Development	23	23 sites

Reducing the toxicity of the solid waste stream by supporting municipal efforts to collect and properly manage discarded hazardous household products has been a long-time focus of these programs. The “technical assistance” and “transfer station” categories include funding that totaled about \$750,000 that has helped municipalities establish six permanent centers for collecting household hazardous waste (located in Greenfield, Lexington, Newton, Northfield, Quincy, and Wellesley). In addition, MassDEP has provided technical and other support for many communities that have held one-day household hazardous product collection events (although MassDEP has

not directly funded the costs that these events incurred to dispose of the household hazardous products that were collected).

- Municipal Recycling Incentive Program (MRIP): From the beginning of FY98 until mid-year FY03, MassDEP provided \$12.9 million in payments to 241 municipalities for recycling a total of 1.25 million tons of paper, cans and bottles. These payments were separate from grants for recycling equipment and services. This incentive grant program ended in December 2003 when state budget cuts eliminated most of the municipal recycling assistance budget at MassDEP. Over the 5 ½ years in which MRIP operated, the tonnage recycled by municipalities participating in the program increased 26%, compared to an 12% tonnage increase from non-MRIP participant communities between July 1996 and December 2002.<sup>3</sup>.
- Municipal Assistance Coordinators (“MACs”): MassDEP funds a network of six regional coordinators who are assigned to work with municipalities on specific projects that reduce waste, foster regional approaches, improve cost effectiveness and accessibility of services (contracting for solid waste/recycling, collecting discarded hazardous products from households), and implement local pilots. MassDEP Boston and regional staff coordinate and deliver additional assistance. Each year, the MACs deliver more than 10,000 hours of hands-on technical assistance to municipalities throughout the state. Approximately one third of this time is allocated to specific municipal waste reduction projects that are awarded through the Municipal Grant Program each year (averaging 35-40 projects per year).
- Waste Reduction Toolkit: MassDEP produces and distributes a toolkit with case studies, outreach material templates, sample press releases, model recycling ordinances, and step-by-step guidance on how to implement mandatory recycling, conduct effective outreach programs, educate businesses about recycling benefits and options, conduct a community-wide “reuse/recycling” event, and plan for “zero waste” events in the community.

*Workshops, trainings and regional meetings:* MassDEP holds an average of 30 municipal workshops and trainings each year on topics ranging from Pay-As-You-Throw implementation, contracting for solid waste/recycling services, grant programs, school chemical management, outreach strategies, and mercury collection and management. Regional meetings of municipal solid waste officials, organized by MassDEP’s six MACs, focus on cutting edge programs, recycling markets, industry trends, innovative outreach models, etc. In addition, MassDEP holds approximately 10 workshops each year for the general public on home composting and healthy lawns and landscapes.

*General outreach and education:* MassDEP produces and distributes outreach materials for the general public, via municipalities, non-profits, local recycling committees, businesses and schools to promote greater awareness of recycling, composting and waste reduction. This includes the junk mail reduction kit; “Don’t Trash Grass” brochure;

home composting guide; “Recycling Matters” palmcard, “Where Does it All Go?” flier describing what happens to recyclables once they leave the curb, and waste reduction bookmarks. MassDEP also is a key partner in the statewide *Mass Recycles Paper* campaign which provides free downloadable recycling advertisements, billing inserts, the “Grass Roots Guide to Recycling More Paper”, paper shredding event promotions, and a calculator for municipalities to determine potential savings from increasing their paper recycling rate.

MassDEP’s “The Green Team” provides lesson plans and activities for teachers to teach conservation, recycling, energy conservation and climate protection in K-12 classrooms, as well as recycling bins for classrooms and compost bins for school composting programs. During the 2007-08 school year, 825 teachers in 409 schools participated, representing 141,000 students. Since the Green Team was launched in 2003, almost half of the Commonwealth’s public schools have had at least one teacher participate.

### **Commercial Waste Reduction Programs**

MassDEP actively assists businesses and institutions in their efforts to reduce waste and increase recycling, and to develop market-based initiatives for collecting and processing recyclable materials. In addition, the Department ensures that businesses and solid waste service providers comply with the waste bans.

In 2002, MassDEP assessed the potential for additional waste reduction in Massachusetts waste sectors and material categories, which provided valuable guidance for targeting commercial recycling program efforts<sup>4</sup>. As a result of that study, MassDEP has been focusing its technical assistance efforts on business sectors that generate the largest amounts of commercial paper, cardboard and organic materials (especially food waste). These materials have a combined additional annual waste reduction potential of more than 1.6 million tons, representing more than 75% of the total additional commercial waste reduction potential of 2.2 million tons per year. All these streams have the potential to be recycled or composted cost-effectively well beyond existing levels.

MassDEP’s strategy for increasing food waste diversion is focused on simultaneously building processing and hauling infrastructure and working with generators that have the best opportunity to cost-effectively divert food waste from disposal, including supermarkets, hospitals and other health care facilities, hotels and convention centers, colleges and universities, and state institutions such as prisons.

*Building Business Partnerships:* MassDEP develops partnerships with targeted business sectors and encourages cooperative efforts. Specific initiatives include:

- **Supermarket Recycling Program Certification:** MassDEP has partnered with major supermarket chains, the Massachusetts Food Association (MFA), and haulers and compost facilities to increase supermarket composting and recycling. Through this partnership, the Supermarket Recycling Program Certification (SRPC) was created. The SRPC exempts supermarkets that meet recycling performance standards

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<sup>4</sup> Commercial Waste Disposal Assessment Report (for the year 2000).

from waste ban inspections, similar to exemptions for municipalities with Department Approved Recycling Program (DARP) status. Out of the 400+ Massachusetts supermarkets represented by 14 chains and independent stores, 219 stores at 6 major supermarket chains have set up programs that recycle organic waste material. Of these, 87 stores have certified and the remaining 132 are working towards certification. MassDEP continues to provide technical assistance to supermarkets wishing to increase their recycling/organics diversion programs.

- **MA WasteWise Program:** MassDEP has partnered with U.S. EPA's WasteWise program to support and recognize Massachusetts business and institutional recycling programs. The WasteWise program is a free, voluntary partnership program that assists businesses and organizations in implementing waste reduction and recycling programs. Mass. WasteWise provides technical assistance, networking opportunities, annual recognition awards, as well as two waste reduction forums each year. The WasteWise Program is expanding to function as an umbrella program that supports and recognizes MassDEP's targeted sector efforts to increase commercial waste reduction. Participation in this program has grown 74% in the last two years to 122 partner companies. A recent survey of members indicates topics covered are timely and relevant to waste reduction initiatives they are considering implementing. Program success is measured by participation rates in forums as well as voluntary reporting to EPA.
- **Small/Medium Sized Businesses:** MassDEP provides technical assistance to meet the waste management challenges faced by small and medium-sized businesses. Efforts include working with communities to provide access to recycling services through programs sponsored by the municipality or business organizations such as Chambers of Commerce. Examples include targeted waste reduction programs (e.g., the City of Cambridge's food waste recycling program for businesses and the City of Boston's Sustainable Business Leaders Program, which includes recycling as a part of a broader sustainable business program).
- **Future Business Partnerships:** MassDEP is planning to continue to develop partnerships with industry sectors identified as having large volumes of paper and organic materials. To date, MassDEP has worked with hospitals and other health care service providers (in partnership with the Massachusetts Hospital Association), and with hotels and convention centers (which generate large amounts of food waste).

#### *Resource Management Contracting*

MassDEP promotes Resource Management (RM) contracting models for businesses and institutions. Through RM contracting, both the generator and the hauler share incentives for reducing waste, increasing recycling, and saving money. MassDEP has developed a template RM contract bid document for use in conjunction with the state contract FAC 33 - Recycling and Solid Waste Services (the state contract allows state agencies and municipalities to access a wide variety of services at pre-negotiated prices). In the last five years, the concept of RM contracting has gained more popular acceptance. Several

Massachusetts recycling companies have incorporated resource management principals in their operational structure. A recent bidders' conference at a state college attracted 22 representatives from 14 waste management firms and resulted in 8 bids.

### *Recycling Market Development Assistance*

MassDEP currently fosters recycling markets through a combination of awarding limited, targeted grants, building industry partnerships, and providing information and referrals to companies interested in using recycled feed-stocks to produce new products. Specific initiatives include:

- **Recycling Industries Reimbursement Credit (RIRC) grant program:** RIRC is a competitive grant program that provides Massachusetts recycling processors and manufacturers with grants worth up to \$50,000 for capital equipment and research and development to increase their recycling of difficult to recycle materials. Targeted materials are selected on an annual basis and currently include organics and C&D. Since 1999, the RIRC program has given out 63 grants worth a total of \$2,546,000 and leveraged an additional \$12,359,000 of funding for projects to support Massachusetts-based recycling processors and manufacturers. Historically the average size of the grant award has been approximately \$40,000 with funding going towards a variety of projects that will help to increase the capacity to handle difficult to manage materials, or materials that experience economic barriers to recycling.

Examples of past projects are:

- **EL Harvey & Sons** of Hopkinton purchased two conveyors for the purpose of sorting recyclables materials from construction and demolition debris, including wood and asphalt roofing shingles.
  - **Newland Farms** of Norton purchased a front-end loader to increase its capacity to process food waste into compost by 1,500 tons per year.
  - **PJ Keating Company** of Lunenburg purchased a shed to store asphalt roofing shingles to be used in the manufacture of asphalt. The shed keeps shingles dry, and has enabled PJ Keating to increase its annual use of asphalt shingles from 3,000 tons to 7,000 tons.
- **Recycling Loan Fund:** MassDEP provides low-interest loans through the Recycling Loan Fund, which serves the financing needs of the recycling industry (haulers, collectors, processors, manufacturers and retailers) by offering loans ranging from \$50,000 to \$300,000. MassDEP capitalized this program, which is administered under contract with BDC Capital. Since 1996, the Recycling Loan Fund has issued 34 loans worth \$6,945,000, and leveraged an additional \$22,708,000 in support. MassDEP estimates that these loans have helped to create close to 900 recycling-related jobs in Massachusetts. Loans have averaged approximately \$200,000, and support a wide range of recycling-related businesses. Since 2004, the Recycling Loan Fund has offered low cost (4%) capital loans to firms that recycle construction and demolition debris and organic materials, which provides gap financing for projects that will increase the C&D and organics recycling infrastructure in Massachusetts.

- **Environmentally Preferable Purchasing (EPP):** MassDEP works with the Executive Office of Energy and Environmental Affairs and the Operational Services Division to establish recycled product purchasing opportunities and goals for state agencies. By providing input on procurement contracts, working with key stakeholders from other state agencies, and participating in environmentally preferable purchasing conferences and roundtables, MassDEP helps to institutionalize EPP. MassDEP also participates in on-going dialogs with key private and non-profit stakeholder groups supporting EPP such as the Northeast Recycling Council, the Product Stewardship Institute, the Carpet America Recovery Effort (CARE) and the US Green Building Council.

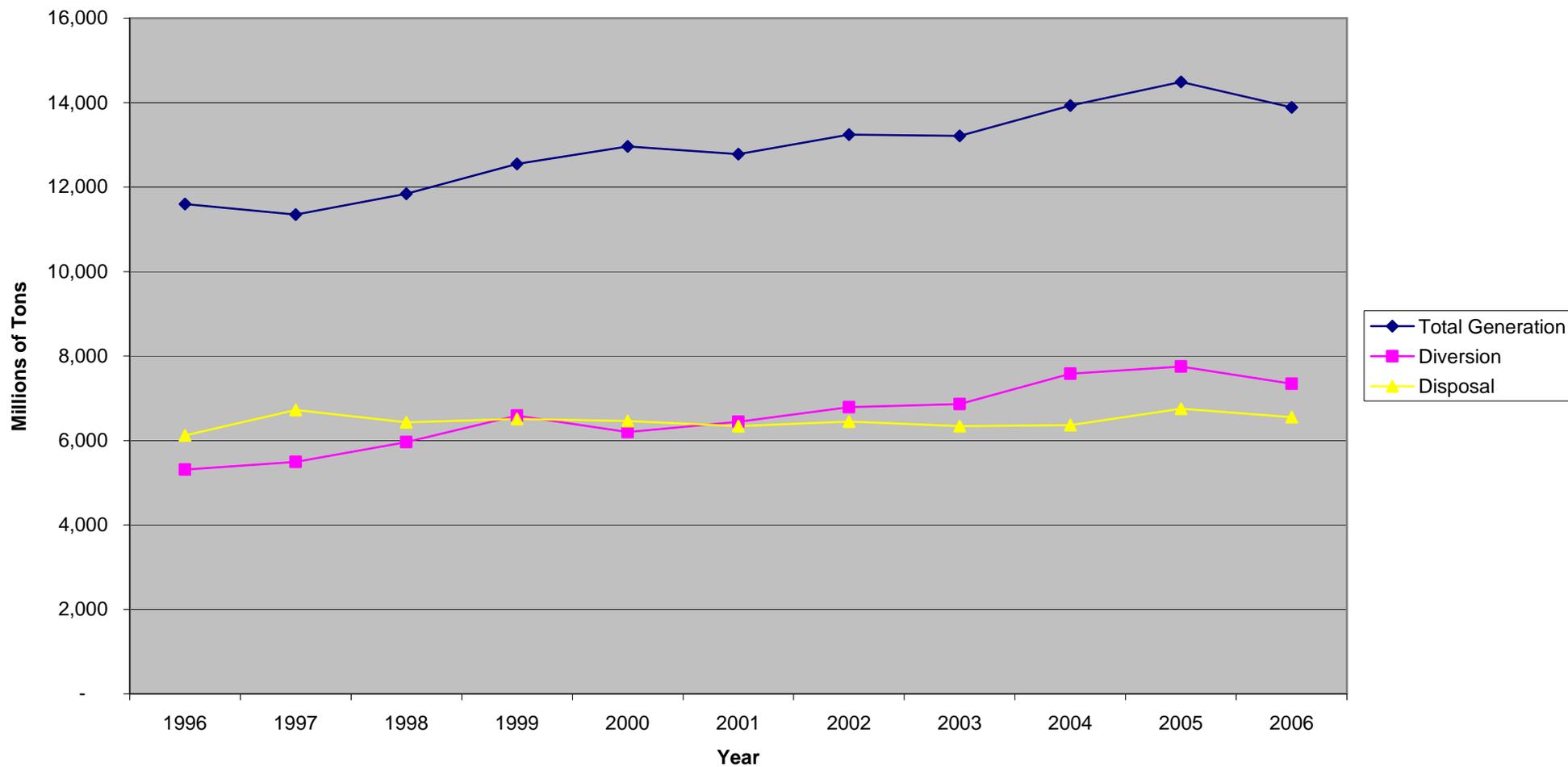
*Organics Processing Capacity:*

Food waste and other organics make up nearly 30 percent of commercial waste that is disposed. This material presents an opportunity for additional commercial waste reduction. Massachusetts has a limited infrastructure for hauling and processing food waste. MassDEP estimates that more than 1.1 million tons of food waste is generated annually by Massachusetts businesses and institutions. Currently, only 130,000 tons of annual food waste processing capacity is currently permitted in Massachusetts, leaving a significant need for new capacity. Establishing in-state food waste processing capacity is critical because this material cannot be cost-effectively transported over long distances.

MassDEP works with farms, cities and towns and large institutions to expand organics processing capacity in Massachusetts. The Department encourages composting operations to expand so they can accept food waste from local generators, and helps large institutions develop composting operations on their sites. Through grants, technical assistance and an annual composting conference, MassDEP has helped to develop new programs and expand current processing capabilities.

#### 4. Summary

### Generation, Disposal and Recycling Trends (MSW and C&D)



## Glossary

Anaerobic digestion occurs when bacteria break down (or “digest”) organic materials in the absence of oxygen.

Beneficial Use Determination is a MassDEP approval to re-use a material that is separated from waste but contains some contamination in new commercial products, to replace virgin material in a regulated facility (such as a landfill), or in applications where people might be exposed to the contaminated material.

Bottle Bill is the Massachusetts Beverage Container Recovery Law (MGL c. 94, sections 321-327)., which requires bottlers and distributors of carbonated and malted beverages to place a \$0.05 deposit on every container sold to retailers (stores) in Massachusetts. Retailers collect the \$0.05 deposit from their customers, for each container purchased. When consumers return empty containers, their deposit for each is returned.

Commercial Waste is waste that is generated by businesses. It can include discarded materials from offices, stores, warehouses, restaurants, institutions (e.g., colleges) and non-hazardous industrial waste.

Compost is a controlled process of decomposing organic material. Naturally occurring soil organisms recycle nitrogen, potash, phosphorus, and other plant nutrients as they convert the material into humus.

Construction and Demolition Waste means the waste building materials and rubble resulting from the construction, remodeling, repair or demolition of buildings, pavements, roads or other structures. Construction and demolition waste includes but is not limited to, concrete, bricks, lumber, masonry, road paving materials, rebar and plaster.

C&D Fines means C&D residuals resulting from the processing of C&D waste that have been screened or otherwise sorted to be less than 3 inches in size.

Construction and Demolition (C&D) Residuals means all materials remaining after processing C&D waste that have not been recycled or recovered and that either need disposal at a solid waste disposal facility (landfill or municipal waste combustor (MWC) or are beneficially reused at a solid waste disposal facility, for example C&D fines used as grading and shaping material or alternative daily cover

Determination of Need is a MassDEP review of a proposal to build a recycling or composting facility that will accept specific types of material that has been pre-sorted before it is sent to the facility. This review determines whether the facility will need to obtain a Site Assignment from the municipality in which it will be located, before it can be built.

Digestion is the biological decomposition of material in a container

Disposal means the final dumping, landfilling or placement of solid waste into or on any land or water or the incineration of solid waste.

Emission means the discharge of an air contaminant into the ambient air.

Gasification is a chemical process that converts carbon-containing material, such as coal, petroleum coke, or MSW into a synthesis gas that can be used for energy production or as a building block for other chemical manufacturing process.

Haulers are private businesses that pick up solid waste from residents and businesses, and take it to a recycling facility, transfer station or disposal facility.

Landfill means a facility or part of a facility established in accordance with a valid site assignment for the disposal of solid waste into or on land.

Leachate is water (usually from rain) that percolates through waste material in a landfill. As the water moves through the waste, it picks up contaminants from the waste material, and it must be collected and properly disposed of, to avoid transferring the contaminants to groundwater.

Material Recovery Facility (MRF) is a facility that sorts and bales paper, glass, plastic and metal containers before selling them to industries which use the recyclables as feedstock in their manufacturing process.

Municipal Solid Waste (MSW) means trash that is discarded by residents, businesses, institutions, and municipalities. It does not include hazardous waste or industrial by-products.

Municipal Waste Combustors (MWCs) are facilities that burn municipal solid waste (commonly known as trash or garbage) at a very high temperature (approximately 2,500°F) to generate electricity or steam power. These facilities are also known as “waste to energy” plants and as “incinerators” (although traditionally, “incinerators” just burn trash and do not generate electricity or steam.

“Pay As You Throw” (PAYT) is a way of funding municipal solid waste collection by charging residents for each bag or barrel of trash they discard and not charging to collect recyclable material.

Processing means the use of a method, technique or process to reduce the volume or alter the physical characteristics of solid waste or of recyclable or compostable materials by separating, baling, shredding, crushing or reworking. Processing prepares materials so they can be used in manufacturing new products or otherwise re-used.

Pyrolysis is the thermal decomposition of organic materials into gases, oils, and char.

Recyclables are discarded materials that can be recycled.

Recycle means to recover materials or by-products which are reused; used as an ingredient or a feedstock in an industrial or manufacturing process to make a marketable product; or used in a particular function or application as an effective substitute for a commercial product or commodity. "Recycle" does not mean to recover energy from the combustion of a material.

Recovery means the use, but not the disposal, of a separated material for energy production or other uses (except use at a solid waste disposal facility) when explicitly approved by MassDEP through policy, Beneficial Use Determination (BUD) or other written approval mechanism. Also, C&D wood, but not mixed C&D, sent to a MWC is considered recovery not disposal.

Site Assignment is a municipal approval of the use of a specific property for a solid waste management facility.

Sludge is the solid material that is suspended in wastewater, and remains after wastewater has been disposed of.

Transfer Stations are facilities that receive, temporarily store, and ship loads of recyclables and solid wastes for transport to a Material Recovery Facility, recycling processor or final disposal site

Waste Bans are prohibition on the disposal of specific materials, as established in the Solid Waste Facility Regulations (310 CMR 19.017). The bans cover materials that can be recycled, and preserve capacity at disposal facilities for materials that cannot be recycled.