MASSACHUSETTS 2010-2020 SOLID WASTE MASTER PLAN

APRIL 2013

Pathway to Zero Waste

Massachusetts Department of Environmental Protection
Executive Office of Energy and Environmental Affairs

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PATHWAY TO ZERO WASTE

EXECUTIVE SUMMARY

Every year, even though Massachusetts boasts one of the highest recycling rates in the nation, the Commonwealth disposes of enough trash to fill 74 Fenway Parks. The disposal of that much material carries a large cost to the environment and the taxpayer wallet. By recycling and re-using more waste materials, Massachusetts cities and towns can save money and benefit the environment as they throw away less trash. The Patrick Administration is committed to developing the tools needed to increase the diversion of solid waste, allow municipalities to save money, and put the Commonwealth squarely on the path to a Zero Waste future.

There are challenges to overcome. Despite new technologies and processes that have improved the ability of residents, businesses and municipalities to handle, sort and recycle materials, recycling rates in Massachusetts have not progressed. As landfills close, municipalities and businesses seek innovative solutions to the problem of higher waste disposal costs, but state government has fewer resources to help. Meanwhile, solid waste management is an important contributor to greenhouse gas (GHG) emissions, which Massachusetts is bound by law to reduce 25 percent by 2020 below 1990 levels and 80 percent by 2050. Through a blend of innovative policies, ranging from technical assistance to legislation to initiatives to support and grow recycling markets, the 2010-2020 Solid Waste Master Plan addresses these challenges and places the Commonwealth on the pathway to higher reuse and recycling rates and reduced disposal. With a continuing commitment on all our parts, we will successfully implement the Plan and make zero waste a reality in Massachusetts.

Solid Waste Master Plan Focus

- Provide assistance to cities and towns and dramatically increase recycling and re-use;

- Seize green economic opportunities to build local markets, jobs and firms in recycling, re-use, and related material management efforts;

- Modify the moratorium on municipal solid waste combustion to encourage innovative and alternative technologies (e.g., gasification or pyrolysis) for converting municipal solid waste to energy or fuel on a limited basis. The moratorium will remain in place for new capacity for traditional combustion of municipal solid waste. Total additional capacity for gasification or pyrolysis of municipal solid waste will be limited statewide to 350,000 tons per year. This limit is set at ½ of the projected in-state capacity shortfall of approximately 700,000 tons if our disposal reduction goals are met, ensuring that we do not overbuild long-term capacity. Proposed projects will have to meet stringent emissions, energy efficiency, and upfront recycling standards. These technologies will be used for those portions of the waste stream for which reuse or recycling are not an option. New facilities will be subject to the same site assignment rules as other facilities. MassDEP will seek stakeholder input while developing performance standards for municipal solid waste conversion facilities. Any new facilities will be required to employ state of the art processing technologies focused on removing recyclable materials to the greatest extent possible so that these facilities do not supplant recycling or re-use options.

- Increase producer responsibility to reduce waste that needs to be recycled or disposed of by municipalities and eliminate products containing toxic chemicals from disposal; and

- Develop integrated solid waste management systems that minimize the amount of material that must ultimately be disposed of.

This Solid Waste Master Plan outlines the Patrick Administration's vision of the future of solid waste reduction and management in the Commonwealth. We look to a future of full recycling bins, empty trash cans, active re-use markets, new green jobs, innovations in recycling technologies, reduced creation and disposal of toxic pollution, and flourishing small businesses.

This vision builds upon the leadership of the Patrick Administration in advancing critical legislative initiatives, like the expanded bottle bill and electronics producer responsibility, that will improve the management of materials that traditionally were seen as waste. The Master

Plan also builds on Massachusetts leadership in the fostering of a vibrant renewable energy industry, the achievement of dramatic energy efficiency gains, and the nation-leading *Massachusetts Clean Energy and Climate Plan for 2020*.

As consumers, businesses and government officials, we can no longer afford our traditional methods of managing waste. Solid waste management currently requires significant expenditures by taxpayers and businesses. Disposal of valuable materials is a waste of resources and lost economic opportunity. Diverting material from the waste stream by reducing generation and increasing reuse, recycling, and composting, saves everyone money, captures valuable resources, protects our environment, and feeds our economy. Over the next decade, annual landfill disposal capacity in Massachusetts is expected to decline by as much as 1.5 million tons. By reducing waste and by recycling and composting more, we can reduce our need for overall disposal capacity and reduce the amount of waste that we will need to ship to other states for disposal as Massachusetts disposal capacity diminishes.

The robust recycling industry that has developed over the past 20 years demonstrates that materials previously considered to be waste have considerable value, in both monetary and natural resource terms. We will work together with recyclers, businesses who want to produce and use recycled products, and other stakeholders to continue to develop the markets and infrastructure that will conserve and capitalize on that value rather than squander it. Already, recycling, reuse, and manufacturing based on recycled feed stocks directly support more than 2,000 businesses with an estimated 14,000 jobs in Massachusetts, maintain a payroll of nearly $500 million, and bring in annual revenues of $3.2 billion[1]. We can do more to divert material from disposal and direct material toward an active and productive second-life in our economy. In doing so, we will reduce greenhouse gas emissions, conserve natural resources, and save energy, while at the same time spurring the expansion of businesses and jobs and reduce disposal costs for waste generators and municipalities.

Diverting more material from disposal is:

- An *environmental opportunity* that will help Massachusetts reduce greenhouse gas emissions, conserve natural resources, and supplement energy conservation;
- An *economic development opportunity* that can spur the expansion of businesses and jobs in the Commonwealth, using materials diverted from waste to make new products and competing the global marketplace; and
- An *opportunity to reduce disposal costs* for waste generators and municipalities.

The pathway to zero waste requires a shift in thinking. Previously, we treated waste as waste. We must think of waste as material that can be used and capitalized upon. We must move toward a comprehensive and integrated approach that manages materials throughout their lifecycles and encourages stakeholders to take their share of responsibility, through smartly designed incentives. That shift in thinking means we will focus on:

- Reducing the production of waste
- Promoting more efficient use of materials;

[1] *U.S. Recycling Information Study*, prepared for the Northeast Recycling Council, February 2009.

- Increasing the recycling of materials that have served their useful purpose;
- Reducing the amount of waste requiring disposal;
- Reducing the toxicity of the waste requiring disposal; and
- Improving the environmental performance of solid waste management facilities.

Materials Management Goals
2020 Goals:

1. Reduce solid waste disposal by 30 percent by 2020, from 6,550,000 tons of disposal in 2008 to 4,550,000 tons of disposal by 2020.
2. Continue to divert toxic substances from the solid waste stream.

2050 Goals:

By 2050, Massachusetts residents and businesses should reduce the amount of waste they dispose of by 80 percent, and virtually eliminate products containing toxic chemicals from our disposal facilities.

Waste reduction has significant greenhouse gas reduction benefits. The 2050 goal aligns with the Global Warming Solutions Act (GWSA, Chapter 298 of the Acts of 2008). While these waste reduction strategies are relatively small contributors to reducing greenhouse gas emissions from Massachusetts sources within Massachusetts covered under the GWSA[2], the broader lifecycle GHG reductions of achieving the Solid Waste Master Plan goals for 2020 could exceed 4 million tons of carbon dioxide annually.

Objectives and Strategies
Three primary objectives form the framework for specific action items to achieve the goals described above over the coming decade. Under each objective, there are a variety of strategies that will help to achieve the Plan's goals. Each objective is listed below, with the primary strategies listed below each objective.

Objective 1: Reduce Waste and Maximize Recycling

- *Increase Business and Institutional Recycling and Composting* – Increase recycling and composting by businesses and institutions through technical assistance to small businesses, require waste haulers to provide full recycling services to their customers, and enforce waste ban compliance by waste generators and haulers more aggressively. Focus on paper and organics as priority materials because they continue to be disposed of in large quantities and they have the greatest potential for significant improvement in their capture and use as resources.

- *Increase Residential Recycling and Composting* – Using technical assistance and targeted grant programs, increase recycling and composting through development of cost-effective municipal and regional residential recycling programs, including Pay-

[2] The *Massachusetts Clean Energy and Climate Plan for 2020* includes a policy to reduce greenhouse gas emissions from municipal waste combustors by reducing the disposal of plastic.

As-You-Throw program expansion, and collection of all recyclables together through single-stream recycling. As with businesses, focus on paper and organics as priority materials for their additional diversion potential.

- *Strengthen Incentives Through Producer Responsibility* – Work with the Legislature to create incentives for better managing products and packaging after use through expanded producer responsibility legislation (such as the "E-waste" bill) and an expanded bottle bill, and develop a broader framework for producer responsibility requirements.

- *Stimulate Greater Reuse of Materials and Products* – Implement a regional materials exchange to facilitate material reuse among businesses and institutions and work with broad groups of stakeholders to develop new strategies to encourage increased reuse of materials and products to save money for businesses, institutions, and residents and to reduce disposal.

- *Deploy Diversion Strategies for Organics and C&D*– Implement integrated organics and C&D diversion strategies that include a combination of initiatives to increase diversion and build markets.

- *Build Local and Regional Recycling Markets* – Drive development of new and expanded recycling markets and bolster existing markets through innovative pilot projects, state procurement, cost-effective regional programs, targeted business development assistance, and aggressive implementation of existing and new waste bans.

- *Commonwealth Leading by Example* – Ensure that state agencies lead by example and implement innovative materials management strategies that improve purchasing efficiencies, reduce waste, maximize the percent of waste that is recycled or composted, and minimize disposal.

- *Statewide Education Campaigns* – Work with municipal, non-profit, and business stakeholders, including the waste management industry, to develop and implement a series of targeted education campaigns and school educational programs to support waste reduction and increased recycling by residents, businesses, and institutions.

- *Eliminate Barriers to Siting Anaerobic Digestion, Recycling and Composting Facilities* – Working with a broad stakeholder group, identify barriers to siting anaerobic digestion, recycling, and composting facilities and develop regulations, technical, and financial mechanisms to mitigate or eliminate those barriers. MassDEP promulgated final rules amending 310 CMR 16.00 and 19.00 streamlining permitting for these facilities in November, 2012 while maintaining strict environmental and public health standards and facility oversight to ensure a high level of environmental performance. See http://www.mass.gov/eea/agencies/massdep/climate-energy/energy/anaerobic-digestion/ for more information.

- *Keep Toxics Out of the Waste Stream* –Expand regional programs to collect and safely manage hazardous household products before they are sent for disposal, implement the Mercury Management Act, and reduce toxics in products and packaging by supporting "Safer Alternatives" legislation and participating in inter-state and national chemical policy reform initiatives.

Objective 2: Improve the Environmental Performance of Solid Waste Facilities

- *Modify the Moratorium on Municipal Waste Combustion* – Modify the moratorium on municipal solid waste combustion to encourage innovative and alternative technologies (e.g., gasification or pyrolysis) for converting municipal solid waste to energy or fuel on a limited basis. The moratorium will remain in place for new capacity for traditional combustion of municipal solid waste. Total additional capacity for gasification or pyrolysis of municipal solid waste will be limited statewide to 350,000 tons per year. This limit is set at ½ of the projected in-state capacity shortfall of approximately 700,000 tons if our disposal reduction goals are met, ensuring that we do not overbuild long-term capacity. Proposed projects will have to meet stringent emissions energy efficiency, and upfront recycling standards. These technologies will be used for those portions of the waste stream for which reuse or recycling are not an option. New facilities will be subject to the same site assignment rules as other facilities. MassDEP will seek stakeholder input while developing performance standards for municipal solid waste conversion facilities. Any new facilities will be required to employ state of the art processing technologies focused on removing recyclable materials to the greatest extent possible so that these facilities do not supplant recycling or re-use options.

- *Improve Solid Waste Facility Waste Ban and Recycling Performance* – Improve facility compliance with waste bans and revise regulations to include more stringent requirements in facility waste ban plans.

- *Reduce Emissions of Municipal Waste Combustors* - Develop regulatory standards that will improve the energy conversion efficiency and improve emission and air pollution control systems for existing municipal waste combustors, particularly for nitrogen oxides and other emissions of concern. When possible within the parameters of existing facilities, enable facility modifications to improve the energy conversion efficiency of existing facilities.

- *Landfill Oversight* - Building on new and stricter standards for landfill setbacks, landfill liners, and ground water monitoring that MassDEP has established since the Beyond 2000 Master Plan, MassDEP will work to ensure that both active and closed landfills comply with stringent environmental requirements and that any inactive landfill closure projects are safely implemented.

Objective 3: Develop Integrated Solid Waste Management Systems

- *Integrated Facility Partnerships* - Work with interested parties, including municipalities and businesses, to develop integrated solid waste management systems that achieve our objectives by integrating reuse, recycling, and composting opportunities into holistic solid waste facility design.

- *Innovative Pilots* - Pilot innovative approaches that can achieve our objective of improving the environmental performance of solid waste facilities, divert up to 100percent of waste materials from disposal, and help achieve the goal of zero waste at a local and regional level.

- *Highlight Successful Systems* - A leadership example of such an integrated approach is provided by Nantucket, which combines the following program actions to achieve a 91 percent recycling rate:
    - biodegradable packaging by law,
    - a comprehensive recycling drop-off center,
    - a materials recovery facility,
    - monthly hazardous product collections,
    - a reuse swap shop,
    - a C&D handling facility, and
    - co-composting of the remaining trash with sewage sludge to produce compost.

Plan Implementation

This Master Plan presents a road map for the next decade, outlining goals and programs for short term implementation along with initiatives that are planned for later in the decade. These strategies and their sequencing builds on the success of the past 20 years by expanding on existing policies, developing new programs, and creating new market and investment opportunities.

The early phases of the plan reflect the challenging budget conditions the Commonwealth currently faces. As fiscal conditions improve, MassDEP will be poised to make further investments in reducing waste, increasing recycling, including Pay-As-You-Throw and single-stream recycling, and composting, and reducing disposal of our materials. For the next two years, MassDEP is proposing to focus on the following priority initiatives:

- Work with municipalities to increase residential and commercial recycling
- Institute improved landfill waste ban compliance requirements
- Implement the Sustainable Materials Recovery Program to provide recycling grants to municipalities and businesses
- Drive increases in construction and demolition debris processing and recycling
- Support existing producer responsibility legislative proposals (Expanded Bottle Bill, and E-waste) and propose new ones that advance the goals of this plan
- Revise solid waste site assignment regulations

- Tighten municipal waste combustor standards
- Increase organics diversion, with a goal of instituting a ban on disposal from commercial and industrial sources in 2014

Under the Green Communities Act (Chapter 169 of the Acts of 2008), municipal waste combustion facilities that meet specified requirements can earn Class II Renewable Energy Credits. These facilities are required to devote 50 percent of the revenue from the sale of these credits to recycling programs approved by MassDEP. Initial estimates show that the total annual value of these credits may be as high as $12 million, which would result in as much as $6 million available for recycling and waste reduction programs on an annual basis. A number of the initiatives in this plan will be funded from this source. Additional revenue sources will be explored.

MassDEP will develop periodic program plans for the strategies outlined here, and will share them with the Solid Waste Advisory Committee and other interested stakeholders. MassDEP will track progress in meeting plan milestones and report on progress. As needed, MassDEP will revise and update the policy framework in this plan, and any significant updates or revisions will be subject to public hearing and comment prior to being finalized.

CHAPTER ONE: INTRODUCTION AND BACKGROUND

1.1 INTRODUCTION

The Solid Waste Master Plan is the Commonwealth's blueprint for reducing solid waste and managing solid waste that is generated, reused, recycled, or disposed by Massachusetts residents and businesses. It establishes a broad policy framework for solid waste management in Massachusetts over the next decade (2010-2020). The *2010-2020 Plan* describes the current state of solid waste management in the Commonwealth, lays out a policy vision, and establishes concrete goals and strategies for approaching that vision in the near term (i.e., by 2020) and achieving the vision by 2050. The Massachusetts Department of Environmental Protection (MassDEP) has prepared this Solid Waste Master Plan (the *2010-2020 Plan*) in accordance with the requirements of Massachusetts General Law Chapter 16, §21[3].

Since 1990, when MassDEP issued the first Solid Waste Master Plan, the Commonwealth has made great progress, recycling 42 percent of the waste we produced in 2009. This is one of the best recycling rates in the nation, but it has not grown during the past decade and we continue to dispose of materials that have significant value. Volatile energy costs, heightened concerns about climate change, renewed interest in more efficient use of waste as second hand materials, and diminishing public resources have prompted MassDEP to reexamine the way we think about solid waste and materials management. The Master Plan for the coming decade needs to take advantage of new market opportunities and provide a framework for improving the overall environmental performance of our solid waste management system. The Master Plan for the coming decade needs to move the Commonwealth toward a zero waste future.

As consumers, businesses and government officials, we can no longer afford our traditional ways of dealing with waste. The robust recycling industry that has developed over the past 20 years demonstrates that materials previously considered to be waste are in fact valuable, in both monetary and natural-resource terms. Our goal is to continue to develop the markets and infrastructure that will conserve and capitalize on that value rather than squander it. In these fiscally constrained times, we need market-based strategies to significantly increase diversion of valuable materials from waste and also increase the demand for second hand material here in the Commonwealth. We must also deal responsibly and cost-effectively with the materials that cannot be recycled or reused in ways that do not harm the environment. The environmental performance of the waste management system is key to reducing all types of pollution, and the new Solid Waste Master Plan establishes strategies that are grounded in marketplace realities and will make significant progress toward these goals in the next decade.

This plan was informed through many meetings and discussions with stakeholders in the Commonwealth's solid waste management system, comments submitted during the public comment period, and by conducting research of successful programs and technologies used by other states and countries. Through this process, more than 300 citizens, businesspeople,

[3] Massachusetts issued its first Solid Waste Master Plan in 1990. This Plan was followed by subsequent plans issued in 2000 (*Beyond 2000 Solid Waste Master Plan)* and in 2006 (Solid Waste Master Plan: 2006 Revision).

municipal officials and other stakeholders identified their best ideas for strategies to advance a new approach to solid waste management in Massachusetts that is needed for the next decade. Information about this public process can be found at MassDEP's web page: http://www.mass.gov/eea/docs/dep/recycle/priorities/mpapp13.pdf - see Appendix J. A list of organizations that participated in these workgroups is included as Appendix H and a summary list of other resources consulted is included as Appendix I. MassDEP considered all of the suggestions and feedback the agency received during this public process, and many of these ideas have been incorporated into the *2010-2020 Plan*. The final 2010-2020 Plan will also address formal comments received on the Draft Plan during the public comment period. MassDEP's responses to those comments will be presented in the Response to Comments document, released together with the Final Plan.

1.2 WHY ARE WASTE REDUCTION AND WASTE MANAGEMENT IMPORTANT?

Solid waste management represents a significant cost to taxpayers and businesses, and disposal of materials causes environmental impacts and is a waste of resources and a lost economic opportunity. The more we can reduce the amount of waste that has to be disposed of by reducing generation and increasing reuse, recycling, and composting, the more money we can all save, the more resources we can capture, and the better we can protect our environment and feed our economy. In the decade before 1990, almost all trash was thrown out in more than 150 landfills and nine "municipal waste combustors" which burn trash and generate electricity. Most of the landfills were owned and operated by municipalities, and 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 to protect public health and the environment. Our solid waste management facilities have installed modern pollution control equipment and adopted operating practices that minimize environmental impact. However, we continue to dispose of materials that have significant value and whose environmental impacts could be avoided if they were reused. Ensuring that disposal facilities are safely designed and operated is important to prevent air and water pollution and avoid potential public health concerns. However, reducing waste generation or recycling and composting waste instead of disposing of it provides even greater benefits. Recycling and composting capture valuable and limited natural resources and enable us to continue to use these materials instead of extracting new ones. Recycling and composting also create jobs and support economic development in the process.

Environmental Benefits

In 2009 alone, Massachusetts prevented the disposal of nearly 5 million tons of waste through recycling, composting and other diversion, eliminating the need for the equivalent of 12 landfills the size of the state's largest (400,000 tons per year). In addition to saving landfill space, waste

reduction conserves natural resources, saves energy, prevents pollution, and reduces greenhouse gas emissions. In 2009, Massachusetts is estimated[4] to have:

- Reduced greenhouse gas emissions by nearly 1.8 million tons of carbon equivalent per year;
- Saved 70 trillion BTUs of energy, equivalent to the annual energy consumption of more than 12 million barrels of oil or nearly 600 million gallons of gasoline; and
- Avoided the use of 1.1 million tons of iron ore, coal, limestone and other natural resources.

The greenhouse gas benefits of achieving this Plan's 2020 goals through source reduction, recycling, and composting could exceed four million tons of CO2 equivalent on an annual basis[5]. Recycling creates environmental and energy conservation benefits, primarily by avoiding the extraction of virgin resources and reducing the environmental impacts of extracting these resources. Capturing these valuable materials provides these critical benefits for our environment and our economy in Massachusetts, but also nationally and internationally.

These lifecycle benefits dwarf the greenhouse gas emissions associated with transporting recycled materials to facilities that will use them, as well as the greenhouse gas emissions of the recycling processes. For example, the greenhouse gas benefits of recycling aluminum instead of disposing it are so large that you would need to transport aluminum about 116,000 miles by truck before the GHG emissions from this transportation would equal the GHG emissions avoided by recycling that aluminum.[6] This relationship holds true for other recyclables as well: cardboard would need to be trucked for 27,000 miles to offset the lifecycle greenhouse gas benefits from recycling it[7].

Over the past decade, climate change has emerged as a critical environmental policy issue. In Massachusetts, the Global Warming Solutions Act (GWSA, enacted in July 2008) requires Massachusetts to reduce greenhouse emissions at least 80 percent below 1990 levels by 2050. Massachusetts has established an interim goal for the Commonwealth to reduce greenhouse gas (GHG) emissions by 25 percent from 1990 levels by 2020, and has published the *Massachusetts Clean Energy and Climate Plan for 2020*, which lays out policies for accomplishing these reductions. The direct emissions from solid waste management activities in Massachusetts (which are limited to emissions from in-state landfills and municipal waste combustors) only represent about four percent of total Massachusetts 1990 baseline GHG emissions. However, the GHG emissions that are generated over the full lifecycle of the materials that are now being disposed (including emissions from overall production, use, transportation and disposal of products and packaging) are estimated to account for 42 percent of total GHG emissions on a

[4] Source: *Environmental Benefits Calculator*, Northeast Recycling Council, April 2009.
[5] Based on an analysis using EPA's WARM model.
[6] *Materials Management, Climate, and Waste: Making the Connections*, West Coast Forum on Climate Change, Waste Prevention, Recovery and Disposal, David Allaway, Oregon Department of Environmental Quality, June 26, 2008, slide 26.
[7] *Materials Management, Climate, and Waste: Making the Connections*, West Coast Forum on Climate Change, Waste Prevention, Recovery and Disposal, David Allaway, Oregon Department of Environmental Quality, June 26, 2008, slide 26.

national basis.[8] Further information is available on the web at http://www.epa.gov/region2/webinars/index.html

Many other states have developed, or are developing, strategies for reducing greenhouse gas emissions as part of their state solid waste plans, their climate action plans, or both. Massachusetts considered the Solid Waste Master Plan strategies that will have the biggest co-benefits for reducing greenhouse gas emissions in the climate action plans required by the Global Warming Solutions Act. This issue is also being examined on a regional basis, with the development of a Climate-Waste Action Plan for the Northeast Region, by the Northeast Waste Management Officials Association. This plan is available on the NEWMOA web site at http://www.newmoa.org/publications/NEWMOAClimate-WasteActionPlan.pdf.

Economic Benefits

Recycling bolsters the state's economy. Recycling, reuse, and remanufacturing (that is, manufacturing based on recycled feed stocks) directly support more than 2,000 businesses with an estimated 14,000 jobs in Massachusetts, maintain a payroll of nearly $500 million, and bring in annual revenues of $3.2 billion[9].

Handling materials through reuse and recycling operations creates many more jobs than handling the same materials through disposal facilities. Materials recovery facilities create 10 times more jobs than landfills and municipal waste combustors, while recycling-based manufacturers create 25 times more jobs than disposal facilities for the same amount of material. Materials reuse operations create even more jobs, between 28 and nearly 300 times the number of jobs as disposal facilities[10]. Appendix I lists some of the companies in Massachusetts that are an important part of our recycling systems.

Diverting material from disposal, whether through up-front waste reduction, reuse, recycling or composting, can save significant disposal costs. Current disposal fees in Massachusetts typically range from $60 to $80 per ton. If we are able to achieve our goal of reducing disposal by 2 million tons per year by 2020, that would result in ***annual*** avoided disposal costs of $120-$160 million. Depending on the status of recycling markets, municipalities or businesses may be able to receive some revenue for recyclable materials; however the greatest benefits will come from avoided disposal costs. It is important to recognize that recycling and composting are not free, as there are collection and processing costs. But the combination of avoided disposal costs and potential material revenues makes recycling, anaerobic digestion and composting cost effective materials management strategies.

1.3 WHAT IS IN OUR WASTE AND HOW DO WE MANAGE IT?

Solid Waste Composition

The 2010-2020 Plan addresses trash that is produced by residents and businesses (referred to as

[8] As presented in June 4, 2009 US EPA Region 1 webinar, What is the Climate-Waste Prevention Connection?", citing forthcoming US EPA report titled *Opportunities to Reduce Greenhouse Gas Emissions through Materials and Land Management Practices*

[9] *U.S. Recycling Information Study*, prepared for the Northeast Recycling Council, February 2009.

[10] Institute for Local Self-Reliance, Washington, DC, 1997. Found on http://ilsr.org/recycling-means-business/, 5/11/15.

"Municipal Solid Waste" or "MSW"), as well as waste primarily from building construction and demolition (C&D debris), and smaller amounts of sludge from wastewater treatment, non-hazardous industrial solid waste, and other wastes that are managed in part at solid waste facilities. MSW typically contains a wide variety of discarded materials, including food scraps, yard waste, paper and paperboard products, plastics, metal, rubber, leather, textiles, wood, glass, and other miscellaneous materials. Figure 1 shows the typical composition of municipal solid waste based on waste characterization studies conducted in Massachusetts in 2010. When referring to "solid waste" in this document, unless specified otherwise, we are referring to MSW and C&D debris.

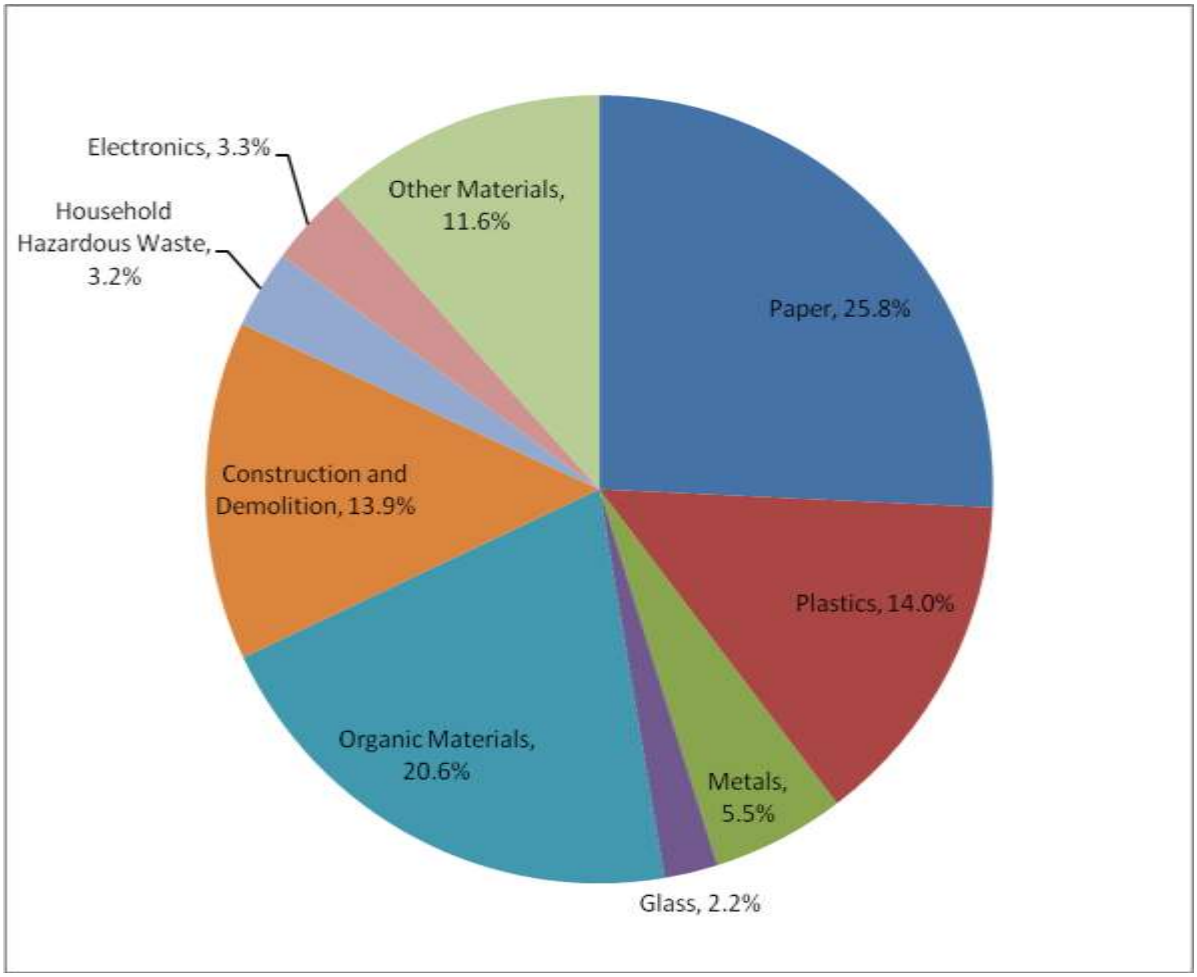

Figure 1 Municipal Solid Waste Composition

Construction and Demolition Debris (C&D) – generated from the construction, renovation and demolition of buildings, roads, bridges and other structures – is the other major component of solid waste. C&D waste typically includes asphalt, brick, concrete, metal, wood, wallboard, and roofing and siding materials (such as wood and asphalt shingles). Wood waste can be natural lumber, painted or stained, unpainted or untreated, pressure-treated, or "engineered" (particle board, for example), and also can take the form of discarded pallets and crates. Figure 2 below

shows the estimated composition of building construction and demolition debris in Massachusetts, not including asphalt and concrete from bridge and roadway construction projects.

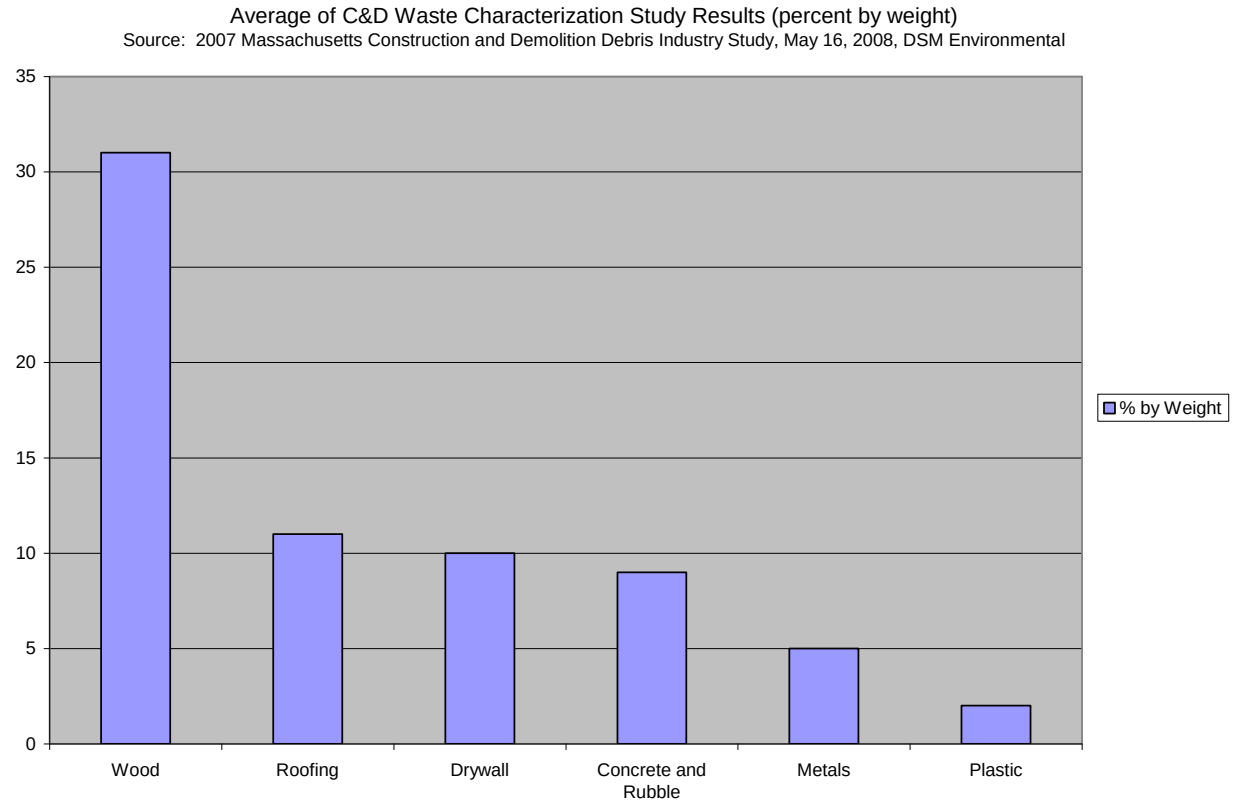

Figure 2 Construction and Demolition Debris Composition

There are other types of non-hazardous waste produced in our society, including 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 or C&D waste. For example, "end of life" vehicles are crushed and shredded; the resulting steel is shipped to steel mills 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 and are not counted in the solid waste generation data that MassDEP tracks (including Table 1.1). However, in some cases, these materials may be managed in part by solid waste facilities, which can indirectly affect the management of MSW and C&D.

Looking Beyond MSW and C&D Materials

This box provides a summary of four material categories that are generally considered as separate from MSW and C&D debris, but rely in part on solid waste facilities for disposal solutions.

Coal Combustion Wastes
Four coal-fired power plants – Mt. Tom in Holyoke, Brayton Point & NRG Energy in Somerset, and Salem Harbor in Salem – generate almost all the coal ash in Massachusetts. In 2008, after adjusting for a temporary plant shutdown at Salem Harbor, these plants generated nearly 489,000 tons of coal ash, of which 86 percent was beneficially used and 14 percent was disposed of in ash landfills. Beneficial uses include cement production, concrete and concrete products, grout, flowable fill, structural fill, embankments, and soil modification and stabilization. Note that Somerset station closed in 2010 and Salem Harbor is due to close in 2014.

Contaminated Soil
Approximately 540,000 cubic yards of contaminated soils were generated at cleanups of approximately 550 oil or hazardous material disposal sites in Massachusetts from January 2009 through July 2009. Disposal site cleanup requirements are established under MGL chapter 21E and the Massachusetts Contingency Plan (310 CMR 40.0000). The management of contaminated soil under these requirements includes on-site and off-site reuse, recycling, treatment and/or landfill related uses, including landfill daily cover. 28 percent of the contaminated soils were reused, recycled, or treated on site; 38 percent were reused, recycled, or treated off site; 5 percent were sent to landfills for daily cover; and 29 percent were sent to regulated landfills for disposal.

Fresh Water and Marine Dredge Spoils
Dredge projects occur in both fresh and ocean waters, and normally involve maintenance activities or the construction of new facilities. In 2008, nearly 50 projects generated 583,724 cubic yards of dredge. 28 percent was beneficially used in non-landfill projects, including beach nourishment and bank stabilization projects. 1 percent was beneficially used as landfill daily cover, and the remaining 71 percent was managed through off-shore ocean disposal or disposed of in landfills.

Wastewater Treatment Plant and Paper Mill Sludge
Sludge is generated when treating municipal, industrial, and paper mill wastewater. In 2005-2006, 176,732 dry tons of sludge was generated. 43 percent were incinerated, 30 percent were beneficially used, and 24 percent were landfilled. Beneficial uses for sludges include composting them and using them as a soil amendment, or drying them into fertilizer pellets.

In addition to these materials that are generated on a regular basis, the Commonwealth also needs to plan for potentially very large amounts of debris that can be generated by natural or man-made

disaster events. The box below summarizes Massachusetts disaster debris planning work.

Disaster debris management planning
Large storms and other disaster events can produce significant amounts of building demolition debris, which needs to be managed on an emergency basis, and can overwhelm the regular trash, recycling, and composting infrastructure. MassDEP has developed an updated Disaster Debris Management Plan, which is an annex to the Commonwealth's Comprehensive Emergency Management Plan. The debris plan is intended to guide state and local response in the wake of large disaster events that generate large amounts of debris. The debris plan emphasizes maximizing debris segregation at the point of initial collection to enable the maximum degree of diversion from disposal facilities. MassDEP also has established guidance to inform and guide the development of local government disaster debris management plans that are consistent with the state plan, can help municipalities to manage disaster debris more cost-effectively, and to ensure that they can be reimbursed to the maximum extent possible for the costs they incur.

Solid Waste Management in Massachusetts, 2000-09
Figure 3 below shows the amount of solid waste generated in Massachusetts from 2000 through 2009, and how it was managed. In this context, solid waste refers to MSW and C&D debris and does not include the materials discussed in the above text boxes. In 2009, 42 percent of all solid waste generated was diverted from disposal to recycling and composting. An additional 4 percent of waste was diverted from disposal to other uses, including wood for fuel and material derived from construction and demolition debris that was used for daily cover or grading and shaping material at landfills.

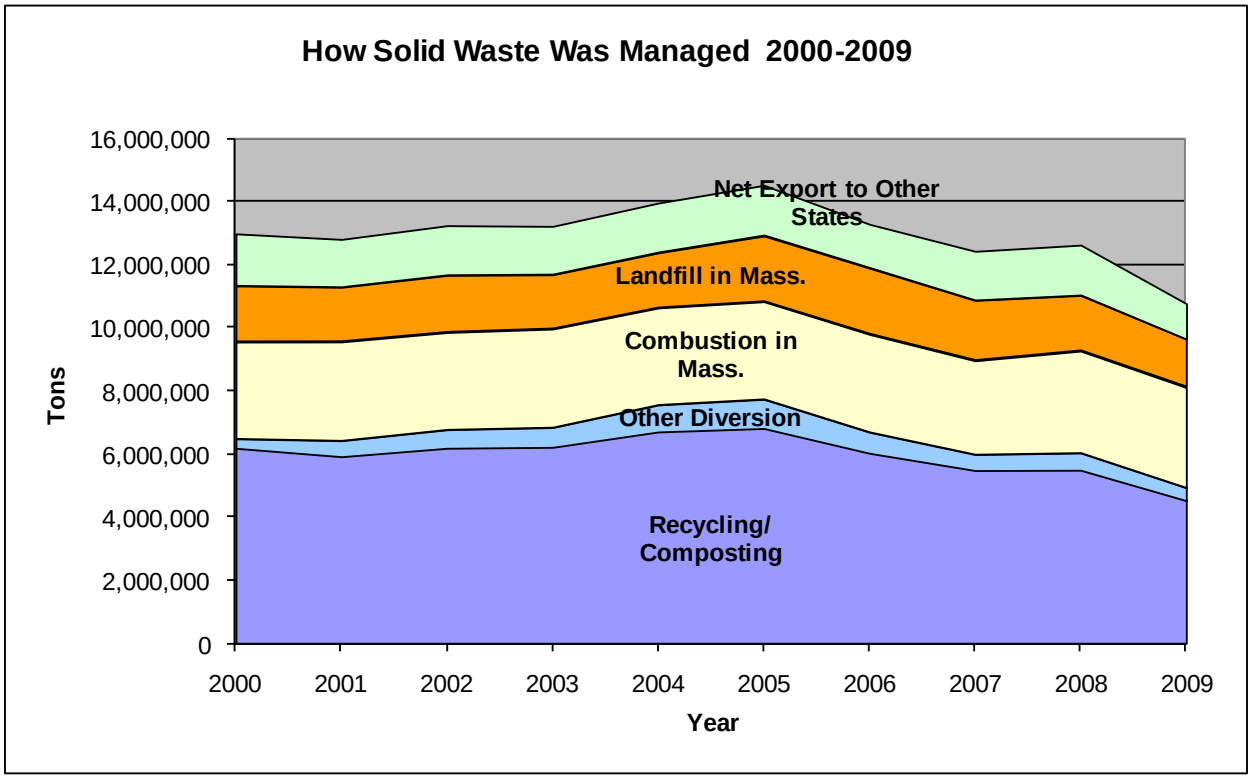

Figure 3 Massachusetts Annual Solid Waste Management: 2000-2009 (tons)

Between 2000 and 2009, the overall recycling rate in the Commonwealth declined from 48 percent to 42 percent. However this trend was accompanied by significant decreases in both generation and disposal during this time period: annual waste generation dropped from 13.0 million tons in 2000 to 10.7 million tons in 2009 (a 17 percent decrease), and total disposal dropped from 6.5 million tons in 2000 to 5.8 million tons in 2009 (a 10 percent decrease). While Massachusetts recycling rate continues to compare well to leading states nationally, we have fallen short of our goals to increase recycling during this period.

It is important to note that decreases in recycling tonnage do not necessarily mean that people have stopped recycling or are recycling less. There are several factors that have contributed to decreases in recycling tonnage, including smaller newspapers, reduced newspaper circulation, and light weighting of bottles, cans, and other packaging. As a result, less material (by weight) is available to be recycled, which results in lower recycling tonnage.

Summary data for 2000 and 2009 are listed in Table 1. More detailed solid waste management data are available in *Appendix B.*

Table 1 Massachusetts Solid Waste Management in 2000 and 2009 (tons)

			2000	2009
Total Generation			**12,960,000**	**10,740,000**
MSW			7,990,000	7,580,000
Non-MSW		(primarily C&D)	4,970,000	3,160,000
Diversion			**6,500,000**	**4,940,000**
MSW			2,700,000	2,590,000
		Recycling	2,110,000	1,940,000
		Composting	590,000	650,000
Non-MSW			3,800,000	2,350,000
		C&D Recycling	3,500,000	1,940,000
		Other Non-MSW Diversion	300,000	410,000
Disposal			**6,460,000**	**5,800,000**
	Landfill		1,760,000	1,500,000
	Combustion		3,070,000	3,180,000
	Net Exports		1,630,000	1,120,000
		Exports	1,770,000	1,590,000
		Imports	140,000	470,000

Statutory and Regulatory Framework

Solid waste is everybody's business. Managing it involves residents and businesses that generate waste, businesses that operate recycling, composting and solid waste facilities and cities and towns that run recycling, composting, and solid waste programs. Municipalities play an important role in determining how solid waste will be managed within their boundaries. Private businesses play a primary role in constructing and operating recycling and composting facilities, transfer stations, and disposal facilities and determine where waste is sent to be managed. Figure 4 provides a diagram of how solid waste is managed in the Commonwealth.

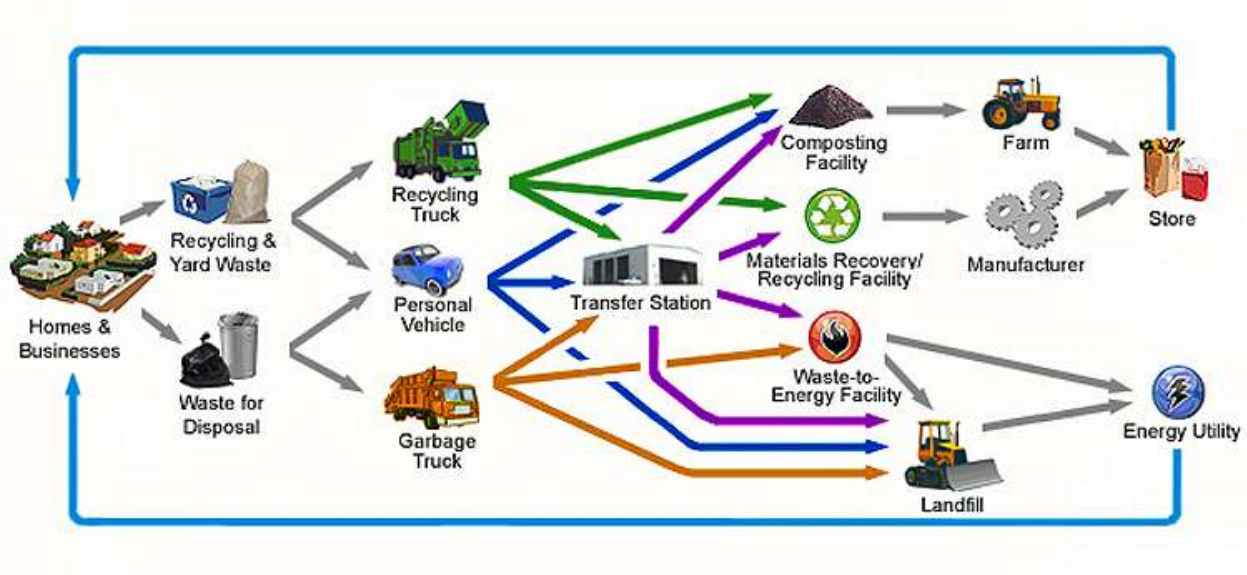

Figure 4 Solid Waste Management System Material Flows

Government shapes and guides the solid waste management system in several ways:

- The US Environmental Protection Agency (US EPA) sets minimum performance standards for landfills and municipal waste combustion facilities and provides some funding and incentives (e.g., recognition) for waste diversion. US EPA also does research into technologies and sustainable practices (e.g., green chemistry, "Design for the Environment") to minimize quantities and toxicity of the waste stream.

- The Commonwealth of Massachusetts regulates and permits solid waste management facilities, oversees facility compliance with regulatory requirements and performance standards, establishes standards for local site assignment decisions, provides resources (funding and incentives) for recycling, composting, and waste reduction, and leads by example through its own agency actions.

- Local governments review and approve or deny requests for local site assignments for solid waste facilities as required, and many operate or contract for the operation of recycling, composting, and solid waste programs and establish local solid waste management ordinances.

For more information on the role that government agencies play in the solid waste management system, see http://www.mass.gov/eea/docs/dep/recycle/solid/swminma.pdf.

1.4 WASTE MANAGEMENT CHALLENGES 2010-2020

Achieving additional recycling progress

To continue progress in increasing recycling we must address two challenges: first, working with global markets and demand for recyclable materials and second, increasing the supply of recyclable materials that are separated for use in recycling markets.

- *Changes in market demand*
  Recycling markets have fluctuated widely over the last decade, presenting challenges for the recycling industry and for cities and towns that run recycling programs. After all-time highs in recyclable material values that were seen in 2006 through the first half of 2008, the value of recyclables dropped dramatically in the second half of 2008 along with the global economic recession. Since then, many recycling markets have rebounded. These rapid changes indicate the need to develop recycling programs that are based primarily on diverting material from disposal and the associated cost savings. These programs need to have the flexibility to cope with material values that fluctuate widely over time (rather than relying on expectations of recycling revenue that may or may not be realized). The establishment of new local and regional markets for diverted materials can help to buffer and absorb changes in export markets, which points to the need to develop home-grown industries that will use material diverted from Massachusetts' waste.

- *Flat supply of separated recyclables*
  In Massachusetts, and most states around the country, recycling rates have remained level or dropped slightly in recent years. The fact that many citizens, municipalities, and businesses have embraced recycling as a way to protect the environment has resulted in tremendous gains. However, many of the initial gains have been made and further recycling advances require new strategies by the public, government, business, and the waste industry to maximize the separation of recyclables from trash. The *2010-2020 Plan* includes a series of success stories about municipalities, businesses, and institutions that have been able to increase their recycling and composting and, in many cases, save money at the same time. Massachusetts can make great strides in increasing recycling and composting by learning from and replicating these successful strategies on a broader scale.

Siting facilities that divert materials from disposal

There are materials which, when diverted from the solid waste stream, are more like raw materials than solid waste. For example, separated organics are well suited to producing compost and/or producing energy through anaerobic digestion. The limited capacity for making recyclables or organics into new products is an important barrier to increasing the diversion of these materials from disposal. For example, Massachusetts currently has few facilities that can receive and process organic materials such as food waste from restaurants, grocery stores, and institutions. MassDEP is working on eliminating the regulatory barriers to such facilities, while ensuring that these facilities are properly overseen to prevent them from polluting air and water and creating nuisance conditions.

Projected loss of in-state landfill capacity

Massachusetts landfill capacity is expected to decline from just under two million tons in 2010 to about 600,000 tons in 2020 as current landfills close and are not replaced. Without increased

source reduction, recycling, composting, or in-state disposal capacity, net export could rise from 1.1 million tons per year in 2009 to nearly 2.0 million tons per year, or about 18 percent of the projected annual solid waste generation, in 2020.

This capacity can be made up for by:

- Preventing waste from being generated in the first place;
- Increasing recycling and composting;
- Developing new in-state disposal capacity; and/or
- Increasing export of waste to disposal facilities in other states.

A loss of landfill capacity will also create issues for a number of special wastes that are currently managed (in part) at landfills. These materials, which are not generally tracked with MSW and C&D, include contaminated soil, residuals from vehicle shredding operations, dredge spoils, and some sewage sludge. Please see the text box on page 7 for more information on how these materials are managed. As there are fewer landfills in Massachusetts, in-state outlets for these materials are becoming scarcer. MassDEP will continue to track the status of how these materials are managed and identify and assess additional management alternatives.

Toxics in Products and Packaging

There is mounting scientific evidence and growing public concern about the hazards of chemicals contained in consumer products and packaging, their risks to users of the products, and risks from air and water pollution created when products are disposed. To address this, some states are following the lead of the European Union to assess and reduce the use of toxic chemicals in products and packaging. Massachusetts has a long-standing commitment to reducing the use of toxics through the Toxics Use Reduction Act (TURA). TURA requires large Massachusetts manufacturers to report their use of listed toxics and develop plans to reduce use of toxics and identify alternatives, significantly reducing the hazardous waste generated by these companies. In 2006, Massachusetts passed the Mercury Management Act that requires manufacturers of products containing mercury to collect "end of life" products and recycle the mercury, and bans the sale of certain products containing mercury. This approach has provided strong incentives for manufacturers to replace the hazardous materials in their products with more benign substances, and in some cases to redesign products and packaging to make them easier to recycle and/or to create less waste at the end of the product's life.

A number of states are developing new legislative initiatives that would divert products and packaging that contain toxics from the solid waste stream and/or require the use of safer chemicals where practical. Governor Patrick's Administration has worked closely with the legislature and stakeholders to develop a Safer Alternatives bill that will phase out products with toxic chemicals when economic alternatives are available.

1.5 OUR VISION FOR MATERIALS MANAGEMENT IN MASSACHUSETTS

The *Beyond 2000 Solid Waste Master Plan* established a broad vision for 2000-2010, including:

- Reducing the quantity and toxicity of our waste to the irreducible minimum, leaving as little waste as possible to be disposed,
- Disposing only residuals from recycling and other waste reduction efforts, and
- Ensuring that waste handling facilities are environmentally sound.

Ten years later, we are approaching the limits of what can be recycled under our current approach, and in-state disposal capacity continues to shrink. The Commonwealth needs a new set of strategies for advancing waste reduction and significantly decreasing the amount of waste which requires disposal.

Diverting more material from disposal is:

- An *environmental opportunity* that will help Massachusetts reduce greenhouse gas emissions, conserve natural resources, and supplement energy conservation;
- An *economic development opportunity* that can spur the expansion of businesses and jobs in the Commonwealth, using materials diverted from waste to make new products and competing the global marketplace; and
- An *opportunity to reduce disposal costs* for waste generators and municipalities

The *2010-2020 Solid Waste Master Plan* emphasizes a shift in thinking toward a more comprehensive and integrated approach that manages materials throughout their lifecycles. As such, our focus needs to be on:

- Promoting more efficient use of materials,
- Increasing recycling of materials that have served their useful purpose,
- Reducing the amount of waste requiring disposal,
- Reducing the toxicity of the waste requiring disposal, and
- Improving the environmental performance of solid waste management facilities.

It also lays the groundwork for a zero waste approach for the future, where all materials are efficiently used and then given a future use – whether in new products, nutrients returned to the earth, or energy.

New Initiatives

The Commonwealth's policy is to meet our waste management capacity need primarily through the development of increased recycling and composting capacity, instead of through the development of long-term disposal capacity. This Plan continues and/or expands a number of existing initiatives and includes several critical new initiatives to more effectively reduce the amount of waste that is generated and disposed. Major new initiatives include:

- Using recycling funding from municipal waste combustor renewable energy credits to fund recycling and composting initiatives through the Sustainable Materials Recovery Program.
- Establish a framework for a producer responsibility system. Work with Northeast states on a regional framework;

- Requiring haulers to provide full recycling services to their customers to ensure a level playing field for all waste haulers;
- Amending Massachusetts' siting regulations to streamline siting of recycling, anaerobic digestion and composting facilities while ensuring a high level of environmental performance;
- Expanding MassDEP's authority over problem landfills to step in and conduct site cleanup work if needed;
- Establishing more rigorous waste ban standards and requiring waste composition studies by municipal waste combustors and landfills; and

More detailed background information on solid waste management in Massachusetts is provided in the Plan's Appendices.

CHAPTER TWO: GOALS AND POLICY FRAMEWORK

2.1 SHORT AND LONG TERM GOALS

Achieving a new vision for materials management in Massachusetts will require a fundamental shift in the way materials are viewed. We need to think first about reusing/recycling/composting unwanted materials that have commercial value before we think about disposing of them. The solid waste management industry (haulers, transfer stations, disposal facilities), businesses and institutions that generate waste, residents, and municipalities need to participate fully in this discussion of other outcomes for the products they manage after use. Product manufacturers also need to think about how to make their products easier and less costly to reuse or recycle.

In moving towards a zero waste goal, Massachusetts needs to strive to minimize the amount and toxicity of waste disposed by reducing waste generation, building new recycling and composting markets, and maximizing other opportunities for diversion. Since 2000, Massachusetts has evaluated its progress toward meeting the goals established by the *Beyond 2000 Solid Waste Master Plan* by setting a goal of achieving a 70 percent waste reduction rate by 2010 (See Appendix A).

Waste reduction is a term that encompasses all of the ways in which we prevent waste from needing to be disposed. It includes source reduction (not generating waste in the first place), reuse, recycling, composting, and other diversion such as using source separated materials as fuels. This waste reduction rate is estimated by comparing changes in waste generation to changes in the overall Massachusetts economy, rather than by directly measuring actual source reduction activity. While we know that significant source reduction is happening (e.g., beverage containers are made with less plastic, and each newspaper contains fewer and smaller pages), the difficulties in measuring these actual reductions make it difficult to quantify overall source reduction in a meaningful way. In 2006, MassDEP updated the Solid Waste Master Plan and established a specific sub-goal for recycling 56 percent of our waste by 2010.

MassDEP now believes that disposal reduction is a simpler, more direct, and more effective metric for evaluating waste reduction and diversion progress, including source reduction, recycling, composting, and other forms of diversion. Therefore, the *2010-2020 Plan* shifts our measure of progress from a waste reduction rate to a disposal reduction target. MassDEP will measure disposal reduction by comparing the total disposal in a future year against disposal in 2008 as a baseline year. Because many stakeholders continue to rely on recycling rates as an indicator of progress, MassDEP also will continue to measure and evaluate the Commonwealth's recycling rate.

2020 Goals:

1. Reduce annual solid waste disposal 30 percent by 2020, from 6,550,000 tons of disposal in 2008 to 4,550,000 tons of disposal in 2020. This reduction in disposal could happen through varying combinations of source reduction, material reuse, recycling, composting, and using source separated materials as fuels, or other beneficial uses of materials. Although MassDEP is not proposing a specific recycling rate goal, as the recycling rate could vary widely depending on

generation levels and the type of disposal reduction achieved[11], this reduction would result in a 58 percent diversion rate based on 2008 baseline generation

2. Continue to strive to divert toxic substances from the solid waste stream.

2050 Goals:
The 2020 Plan lays a foundation for the long-term goal – to achieve "zero waste". By 2050, Massachusetts should reduce the amount of waste residents and businesses dispose of by 80 percent, and virtually eliminate products containing toxic chemicals from our disposal facilities. Reducing disposal by 80 percent from the 2008 baseline would result in total 2050 disposal of 1,310,000 tons per year. Based on 2008 generation, this would equate to a diversion rate of 90 percent.

This 2050 goal aligns with the Global Warming Solutions Act (GWSA, Chapter 298 of the Acts of 2008) target of reducing greenhouse gas levels 80 percent below 1990 levels by 2050, since waste reduction has significant GHG reduction benefits. Therefore the initiatives in this Plan also are also included as potential strategies for reducing greenhouse gas emissions that are required by this Act[12].

Management Capacity Needs to Support 2020 Goals:
This goal of reduced solid waste disposal could be achieved through any combination of source reduction, reuse, recycling, composting, and other forms of diversion, so Massachusetts would not necessarily need 2 million tons of additional recycling and composting capacity to meet this goal. Because conditionally exempt recycling facilities do not have specific ton per day permit conditions and because many facilities are operating at only a fraction of their operational capacity right now, there is significant additional capacity at existing facilities. In addition, since most recycling markets are regional, national, or even international in nature, the full management capacity does not have to be located in Massachusetts. If we assume that ½ of this management capacity need, or 1 million tons per year, would need to be met through new capacity located in Massachusetts, this would require approximately 33 additional 100 ton per day recycling or composting facilities by 2020. However, MassDEP believes that the need for additional recycling and composting capacity will likely be much smaller than this, because there is already significant capacity that is not being used or capacity that can be easily expanded at existing facilities.

[11] This disposal reduction goal does not equate to a specific recycling or diversion rate and, therefore, it is not possible to directly compare this goal to other state's recycling goals. And, state recycling goal and rate comparisons are unreliable in general because methodologies for calculating recycling rates vary so widely from one state to another. However, if we assume that total waste generation in 2020 is the same as the 2008 baseline generation, this disposal reduction goal would translate to a diversion rate of64 percent in 2020.

[12] It is important to keep in mind that the GHG reductions required by the GWSA must typically be direct emission reductions from in-state sources, so that much of the emission reductions achieved through increased recycling composting that are due to upstream production and supply chain changes may not count toward the GWSA targets. However, these reductions are still consistent with the larger, more global purpose of the GWSA.

2.2 WHAT ARE THE PRIORITY MATERIALS?

MassDEP began to prioritize waste reduction by material category in the 2006 Solid Waste Master Plan revision. MassDEP identified paper, organics, and wood as priorities for state resources and actions based on their additional diversion potential. Figure 5 below shows the additional annual potential diversion by material category between now and 2020, above and beyond existing recycling and composting in 2008. For example, we estimate that more than 500,000 tons of commercial paper and cardboard could be recycled on an annual basis by 2020, above and beyond existing annual recycling tonnage.

On this chart, material types are listed in the following categories based on the source of the materials:

- Commercial municipal solid waste materials– "Commercial"
- Residential municipal solid waste materials – "Residential"
- Construction and demolition materials – "C&D"

Sufficient additional recycling and composting potential exists across these material categories so that our goal of reducing disposal by 30 percent by 2020 is aggressive, yet feasible. Paper and organics provide the greatest opportunities for additional recycling and composting tonnage, together comprising the top four additional diversion targets and nearly two million tons of additional diversion potential. The policy framework in section 2.3 and the strategies in Chapter 3 focus on these priority materials. However, to maximize our recycling and composting and minimize what is disposed, Massachusetts must also increase diversion of other materials, such as metal, plastic, and construction materials such as wallboard and shingles.

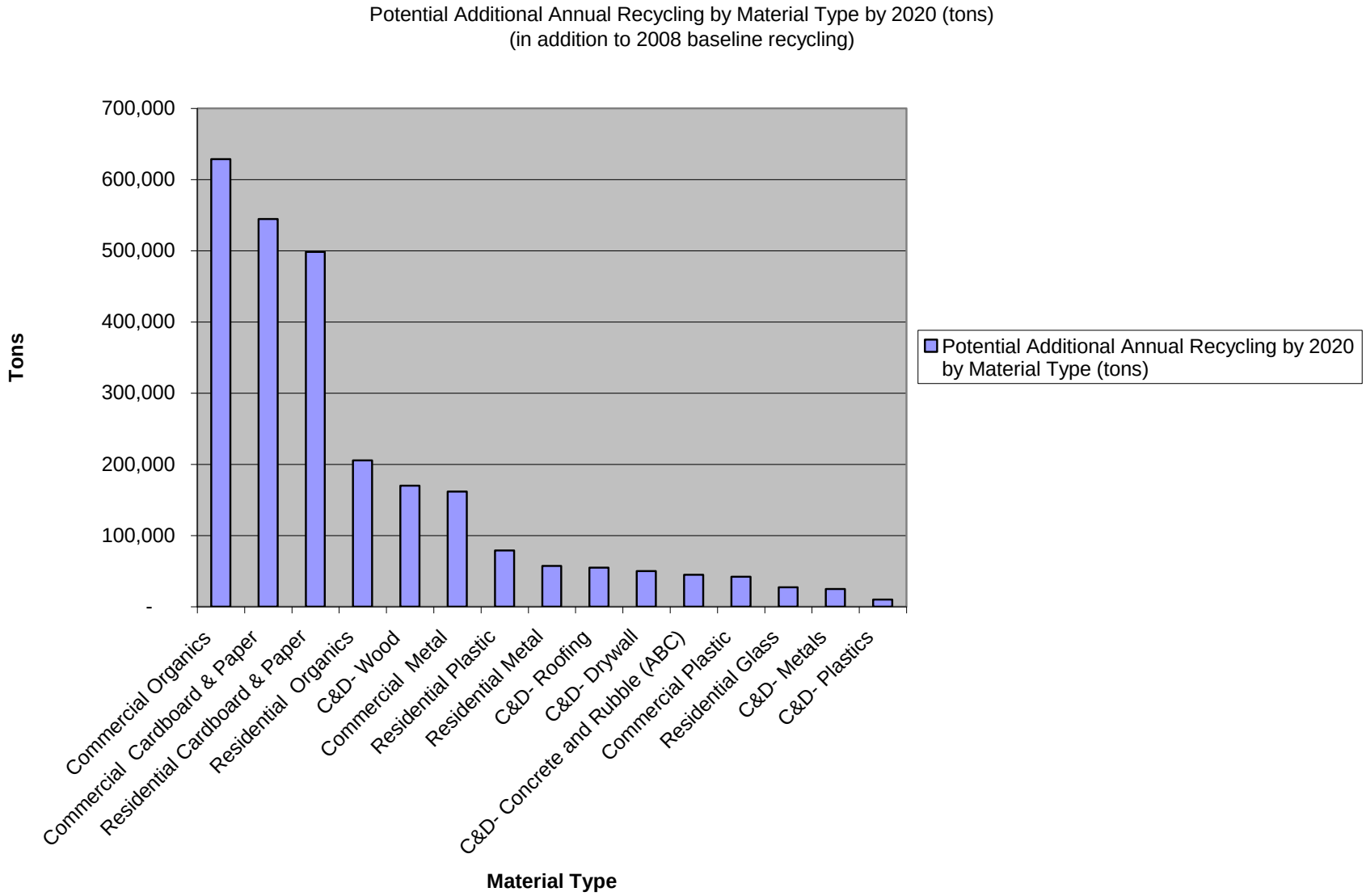

Figure 5 Potential Additional Annual Recycling by Material Type by 2020

2.3 POLICY FRAMEWORK

Objectives and Strategies
Two primary objectives form the framework for specific actions to achieve the goals described above. Under each objective are strategies to help achieve the Plan's goals. Each objective is listed below, with the primary strategies listed below each objective.

Objective 1: Maximize Recycling

- ***Increase Business and Institutional Recycling and Composting***– Increase recycling and composting by businesses and institutions through technical assistance to small businesses, a requirement on waste haulers to provide full recycling services to their customers, and more aggressive enforcement to ensure waste ban compliance by waste generators and haulers. Focus on paper and organics as priority materials because large amounts of paper and food waste continue to be disposed and wasted and these materials have the greatest additional potential to be captured and used as resources, providing environmental and economic benefits.

- ***Increase Residential Recycling and Composting*** – Increase recycling and composting through development of cost-effective municipal and regional residential recycling programs, including market-based approaches such as Pay-As-You-Throw and single-stream recycling, through technical assistance and targeted grants. Focus on paper and organics as priority materials for their additional diversion potential.

- ***Strengthen Incentives Through Producer Responsibility*** – Work with the Legislature to create incentives for better management of products and packaging after their use by supporting electronics (E-waste) producer responsibility legislation and an expanded bottle bill, and partner with other Northeast states to develop a broader regional framework for producer responsibility requirements.

- ***Stimulate Greater Reuse of Materials and Products*** – Implement a regional materials exchange and work with broad groups of stakeholders to develop new strategies to encourage increased reuse of materials and products to save money for businesses, institutions, and residents and to reduce disposal. Note: this strategy is discussed in sections 3.1 (Business and Institutional Recycling and Composting) and section 3.5 (Construction and Demolition Materials Diversion and Market Development.)

- ***Deploy Diversion Strategies for Organics and C&D–*** Implement comprehensive organics and C&D diversion strategies that include a combination of initiatives to drive increased diversion and build markets, including increasing separation of recyclable and compostable materials by generators, building our processing infrastructure, including anaerobic digestion facilities at, Publicly Owned Treatment Works (POTWs)), and using a combination of waste bans and business development assistance to stimulate development of new markets for separated materials.

- ***Eliminate Barriers to Siting Recycling and Composting Facilities*** – MassDEP, in November, 2012, modified regulations to streamline the siting of facilities that support increased recycling and composting, as well as other facilities such as anaerobic digestion facilities that generate energy from source separated organic materials. The new rules maintain strict facility oversight by MassDEP to ensure a high level of environmental performance.

- ***Encourage Technology Development*** – Work with technology developers and municipalities to utilize new technologies and approaches to support strategies such as improving processing of recyclables, collecting recyclables more efficiently, developing new uses for separated recyclables.

- ***Commonwealth Leading by Example –*** Ensure that state agencies lead by example and implement innovative materials management strategies that improve purchasing efficiencies, reduce waste, and maximize the percent of waste that is recycled or composted, and minimize disposal.

- ***Statewide Education Campaigns*** – Work with municipal, non-profit, and business stakeholders (including the waste management industry) to develop and implement a series of targeted education campaigns and school educational programs to support reducing waste and increasing recycling by residents, businesses, and institutions. Note: this strategy is discussed in sections 3.1 (Business and Institutional Recycling and Composting) and section 3.2 (Residential Recycling and Composting.)

- ***Keep Toxics Out of the Waste Stream*** – Expand regional programs to collect and safely manage hazardous household products before they are sent for disposal, implement the Mercury Management Act, support "electronic waste" legislation and reduce toxics in products and packaging by supporting "Safer Alternatives" legislation and participating in inter-state and national chemical policy reform initiatives.

Objective 2: Maximize the Environmental Performance of Solid Waste Facilities

- ***Modify the Moratorium on Municipal Solid Waste Combustion*** - Modify the moratorium on municipal solid waste combustion to encourage innovative and alternative technologies (e.g., gasification or pyrolysis) for converting municipal solid waste to energy or fuel on a limited basis. The moratorium will remain in place for new capacity for traditional combustion of municipal solid waste. Total additional capacity for gasification or pyrolysis of municipal solid waste will be limited statewide to 350,000 tons per year. This limit is set at ½ of the projected in-state capacity shortfall of approximately 700,000 tons if our disposal reduction goals are met, ensuring that we do not overbuild long-term capacity. Proposed projects will have to meet stringent emissions, energy efficiency, and upfront recycling standards. These technologies will be used for those portions of the waste stream for which reuse or recycling are not an option. New facilities will be subject to the same site assignment rules as other facilities. MassDEP will seek stakeholder

input while developing performance standards for municipal solid waste conversion facilities. Any new facilities will be required to employ state of the art processing technologies focused on removing recyclable materials to the greatest extent possible so that these facilities do not supplant recycling or re-use options.

- ***Improve Solid Waste Facility Waste Ban and Recycling Performance*** – Improve facility compliance with waste ban plans and revise waste ban regulations to include more stringent requirements in facility waste ban plans.

- ***Reduce Emissions of Municipal Waste Combustors–*** Develop regulatory standards that would further improve emission and air pollution control systems for existing municipal waste combustors, particularly for nitrogen oxides and other emissions of concern. When possible within the parameters of existing facilities, enable facility modifications to improve the energy conversion efficiency of existing facilities.

- ***Landfill Oversight*** – Building on the more stringent regulations that MassDEP established based on the Beyond 2000 Master Plan, MassDEP will work to ensure that both active and closed landfills comply with stringent environmental requirements and that any inactive landfill closure projects are safely implemented.

Objective 3: Develop Integrated Solid Waste Management Systems

This objective brings together elements of the first two objectives, combining and integrating efforts to increase upfront recycling and composting with innovative facility designs that optimize recycling and material recovery, including.

- Work with interested parties (municipalities and/or businesses) to develop integrated solid waste management systems that maximize recycling and composting and minimize residual materials in need of disposal.

- Pilot innovative approaches that can divert 100 percent of waste materials from disposal, and help achieve the goal of zero waste at a local and regional level.

- A successful example of such an integrated approach is provided by Nantucket, which combines the following program actions to achieve a 91 percent recycling rate:
    - biodegradable packaging by law,
    - a comprehensive recycling drop-off center,
    - a materials recovery facility,
    - monthly hazardous product collections,
    - a reuse swap shop,
    - a C&D handling facility, and
    - co-composting of the remaining trash with sewage sludge to produce compost.

2.4 MOVING FORWARD

The Solid Waste Master Plan applies a combination of legislation, regulation, policy, grants, technical assistance, education, and enforcement to reduce waste, increase recycling, and reduce disposal. The *2010-2020 Plan* presents a road map for the next 10 years. It includes program initiatives for short-term implementation along with initiatives that would move forward later in the decade. This combination of strategies and their sequencing builds on the success of the past 20 years by expanding strategies, developing new programs, and creating new market and investment opportunities. The early phases of the Plan reflect the extremely challenging budget conditions that the Commonwealth currently faces. As fiscal conditions improve, MassDEP will be poised to make further investments in reducing waste, increasing recycling and composting, and reducing disposal of our material resources.

Many of the strategies that support each of the *2010-2020 Plan's* objectives will be advanced using the Commonwealth's existing authority to establish and enforce program requirements and to provide technical and financial assistance to municipal and private sector participants in the solid waste management system. Where resources are available, some of these strategies will be initiated in the short term. Some other strategies will require new legislative authority.

Under the Green Communities Act (Chapter 169 of the Acts of 2008), certain municipal waste combustion facilities that meet specified requirements can earn Class II Renewable Energy Credits. They must devote 50 percent of the revenue from the sale of these credits to recycling programs approved by MassDEP. Initial estimates show that the total annual value of these credits may be as high as $12 million, which would result in as much as $6 million available for recycling and waste reduction programs on an annual basis. A number of the initiatives within this plan will be funded from this revenue.

Another potential funding source is the Expanded Bottle Bill, which Governor Patrick has proposed to the Legislature in 2012 and is expected to propose again in 2013. The expanded bottle bill would extend the nickel bottle deposit to water and certain other non-carbonated beverages, which are estimated to be about 1.5 billion containers per year. An expanded bottle bill would result in a number of important benefits, including:

- More than doubling the recycling rate for those containers and reducing litter from those containers; and
- Generating additional revenue which could be used to support recycling programs. Under the Governor's budget proposal, millions of dollars from abandoned bottle deposits would be allocated to recycling programs on an annual basis.

MassDEP will develop periodic program plans for implementing the strategies outlined here, and will share these plans with the Solid Waste Advisory Committee and other stakeholders. MassDEP also will track progress in meeting milestones and will report on progress achieved during the previous year. As needed, MassDEP will revise and update the policy framework in this *Plan* based on changing conditions and the performance of the solid waste management

system and input from stakeholders. Any updates or revisions to the Plan will go through a process of public hearing and comment prior to being finalized.

Short Term Priorities
For the next two years, MassDEP is proposing to focus on the following priority initiatives:

- **Implement the Sustainable Materials Recovery Program:** Establish and implement the Sustainable Materials Recovery Program, a comprehensive grant program to provide grant funding and technical assistance to municipalities, businesses, institutions, and non-profit organizations, using funding from municipal waste combustion Class II Renewable Energy Credits.
- **Drive Increases in Recycling by the C&D Processing Industry:** Work with construction and demolition debris processors to develop minimum recycling performance standards for C&D processors and support the development of new market outlets for C&D materials.
- **Develop New Legislative Proposals:** Support existing legislative proposals (Safer Alternatives, Expanded Bottle Bill, and E-waste) and propose new ones that advance the goals of this plan, including changes to MassDEP's authority over solid waste facilities and solid waste haulers.
- **Work with Municipalities to Increase Residential Recycling:** Work with municipalities, the Legislature, and other stakeholders to develop new programs to drive increases in residential recycling.
- **Increase the Diversion of Organics:** Work with publicly-owned treatment works (POTWs) to increase the diversion of organics as a supplement to waste water treatment sludge in anaerobic digestion facilities at the POTWs. Promulgate revisions to the solid waste site assignment regulations to streamline siting requirements for facilities that divert waste from disposal, particularly composting and anaerobic digestion facilities that process organic materials.
- **Institute Improved Landfill Waste Ban Compliance Requirements:** Develop new standards for landfill waste ban compliance bans, similar to the municipal waste combustor requirements under the Class II renewable energy credits.
- **Tighten Municipal Waste Combustor Standards:** Reassess municipal waste combustor emissions standards relative to current performance and best available control technology, beginning with further reducing nitrogen oxide emissions, as required by the Clean Air Act, and enable improvements in energy conversion efficiencies.

CHAPTER THREE:
MAXIMIZE RECYCLING AND BUILD MARKETS
(OBJECTIVE 1)

This chapter presents recommended strategies to improve the efficiency of materials use, including source reduction, reuse, recycling, and composting. These strategies build on years of program development and implementation by cities and towns, regional agencies, businesses and institutions, and the solid waste and recycling industry. In many cases, these entities have identified and implemented successful strategies that reduce waste, increase recycling, and save money, sometimes with assistance from MassDEP, sometimes independent of MassDEP. Throughout this chapter we have highlighted successful program strategies and "best practices", as these examples may provide some of the answers for how the goals of this plan to improve materials management in Massachusetts can be met.

3.1 COMMERCIAL AND INSTITUTIONAL RECYCLING AND COMPOSTING

Background

As highlighted in Chapter 2, MassDEP estimates that commercial and institutional recycling on an annual basis could potentially be increased from 2 million tons per year in 2008 to as much as 3.4 million tons per year. The top materials to target are organics and paper as these materials have the potential to be recycled or composted cost-effectively well beyond existing levels. This section focuses on additional recycling of paper and other materials generated by Massachusetts businesses and institutions, such as metal, glass, and plastic. Strategies for increasing recycling and composting of organics and construction and demolition debris materials are presented in separate sections of this chapter.

Many businesspeople are not aware of the restrictions banning the disposal of paper, cardboard, containers food and beverage containers, metal, and other materials in Massachusetts, and there are many areas in the Commonwealth where businesses and institutions do not receive sufficient recycling services. In addition, small and medium size businesses frequently do not know how to design and implement efficient, cost-effective recycling programs.

Objectives

- Divert 900,000 tons of additional paper and other commercial materials from disposal to recycling annually by 2020.
- Use existing regulatory authority to increase compliance with the Massachusetts waste bans by waste generators, haulers, and solid waste facilities.
- Expand knowledge of and access to cost-effective reuse, recycling, composting, and other waste reduction services for small and medium size businesses.

Action Items

- **Business Technical Assistance Coordinators:** Develop the RecyclingWorks in Massachusetts program for businesses and institutions which would provide statewide programs and hands-on assistance to individual businesses and institutions to establish and run cost-effective recycling, composting, and waste reduction programs.

- **Require Waste Haulers to Provide Recycling Services**: Explore the development of legislation to establish new authority for MassDEP to regulate solid waste haulers and establish minimum statewide performance standards for the provision of recycling services to their customers and to require haulers to comply with these standards. The statewide minimum performance standards would include (but would not be limited to) requirements that each hauler operating in Massachusetts:
    - Register with MassDEP,
    - Provide or arrange for recycling services for each customer that contracts for trash hauling/disposal,
    - Educate customers about recycling opportunities and how to recycle (e.g., specific discarded materials may need special handling prior to pickup), and
    - Report periodically to MassDEP on waste quantities delivered to recycling and disposal facilities.

- **Improve Waste Ban Compliance by Haulers and Generators:** Aggressively enforce waste bans through inspections of waste loads arriving at solid waste facilities to increase compliance with waste bans by waste haulers and generators and divert a higher percentage of banned materials from disposal. This initiative will be linked with other initiatives to improve waste ban inspections at municipal waste combustion facilities and landfills described in Section 4.1

- **Recycling Education Campaign:** Work with private sector, local government, and non-profit partners to develop and implement a series of targeted education campaigns on how businesses and institutions can reduce waste and increase recycling.

- **Expand School Recycling and Composting Programs:** Support development of new school recycling and composting programs through the "Green Team" recycling program. The Green Team is an environmental club for Massachusetts schools that provides fun and interactive ways for students and teachers to reduce, reuse, recycle and compost in their classrooms, schools, homes and communities. More than 120,000 students have already participated in the Green Team.

- **Municipal Recycling Program Access for Small Businesses:** Work with cities and towns to increase opportunities for small businesses to access municipal recycling services, including permission to use municipal transfer stations or to participate in municipal curbside recycling programs. Develop financial incentives to encourage public-private partnerships, including one-time upgrades to municipal infrastructure to accommodate changes in operation.

- **Reuse Strategy:** Develop a reuse strategy that would facilitate communication and networking across businesses and non-profit organizations to divert products from disposal to reuse options. This would include inventorying the reuse industry to identify, promote, and grow effective reuse program models.

- **Material Exchanges:** Promote the Massachusetts Material Trader, part of a regional materials exchange, to encourage the reuse of materials within Massachusetts and across the Northeast. This is a web-based exchange available to businesses, institutions, and residents.

- **WasteWise Program:** WasteWise is a voluntary US EPA program, coordinated by MassDEP in Massachusetts, through which participating businesses and institutions set waste reduction goals, design and implement programs, and report on their results. Participating organizations receive technical assistance and public recognition for their efforts. Continue to expand WasteWise and other successful waste reduction programs to target and promote sector and large generator based waste reduction.

- **Business Innovation Pilots:** Fund pilot projects by individual businesses and institutions to reduce waste through innovative technologies and strategies.

- **Web-Based Resources:** Update and expand web-based waste reduction tools, including the Recycling Services Directory to support business recycling efforts across the Commonwealth.

- **Promote Resource Management Contracting:** Resource management contracting is an innovative contracting approach through which contracts with solid waste and recycling haulers are restructured so that haulers and waste generators share incentives and benefits to reduce disposal, increase recycling, and achieve gains in source reduction. Continue to support resource management contracting as a strategy for larger businesses and institutions to increase recycling and reduce waste.

Success Story: Recycling More & Saving on Disposal in Local Schools

Through an in-kind Technical Assistance grant from MassDEP, the City of Pittsfield negotiated a new solid waste management contract that brought recycling service to 14 schools with a student population of more than 6,000. In addition to recycling collection, the new contract required the vendor to supply recycling bins at each school, reducing trash collection costs by 15 percent, or about $15,000 per year, and disposal costs by some $38,000 annually – far exceeding the city's original expectations.

Success Story: Greening Boston Businesses

With $50,000 in start-up funding from MassDEP, the Boston Redevelopment Authority launched an environmental sustainability program for small and medium-sized businesses in the city. Supported by Mayor Thomas Menino, the program provides on-site assessments, recommendations and technical assistance to help participating companies save energy and water, minimize waste, maximize recycling and adopt other environmentally friendly business practices.

The Sustainable Business Leader Program was launched in late 2007 with 25 companies stepping up to be among the first to "green" their operations from top to bottom. Today, more than 60 businesses are participating in the program. Participants and graduates receive "Sustainable Business Leader" logos, decals and publicity. The program has become a model for local business districts and chambers of commerce across Massachusetts.

Success Story: Resource Management Contracting at Raytheon Company

Resource Management (RM) is a new way of looking at an old problem. Businesses, institutions and municipalities reduce waste, increase recycling and lower disposal costs by providing their solid waste contractors with clear financial incentives for managing resources in economically and environmentally responsible ways.

A partner in the MassDEP WasteWise partner, Raytheon Co. transitioned from standard waste management contracting to RM contracting in 2007. The firm recycled two-thirds of the material it no longer needed, generating nearly $2 million in recycling revenues and realizing another $300,000 in avoided trash disposal costs.

3.2 RESIDENTIAL RECYCLING AND COMPOSTING

Background

MassDEP estimates that nearly 1 million additional tons of residential material could be diverted from disposal annually, more than doubling current annual levels of residential recycling and composting. As with commercial waste, paper and organics represent the two greatest material categories for additional diversion potential. There are two major components to achieving high residential recycling rates: convenient access and high levels of participation. Although most residents in Massachusetts have convenient recycling access, there still are substantial access gaps among residents of multi-family dwellings and other residents served by private subscription trash haulers.

In addition, some residents either do not recycle and compost at all or do not do all that they can. Advancing proven programs such as Pay-As-You-Throw (PAYT)[13], mandatory recycling and single stream recycling at the municipal level will significantly increase residential recycling and composting. For municipalities that run residential and solid waste recycling programs, increasing recycling and composting through PAYT, mandatory recycling, increased education and outreach, and other approaches can reduce disposal costs and enable the municipality to run more cost effective solid waste and recycling programs. PAYT programs have been implemented in 132 municipalities (as of June 2010), or, covering 24 percent of the state's population. Figure 6 shows that they have been very successful at increasing recycling and composting and reducing disposal.

[13] In PAYT systems, residents pay for each *unit of waste discarded* rather than paying a fixed fee for all of their solid waste disposal.

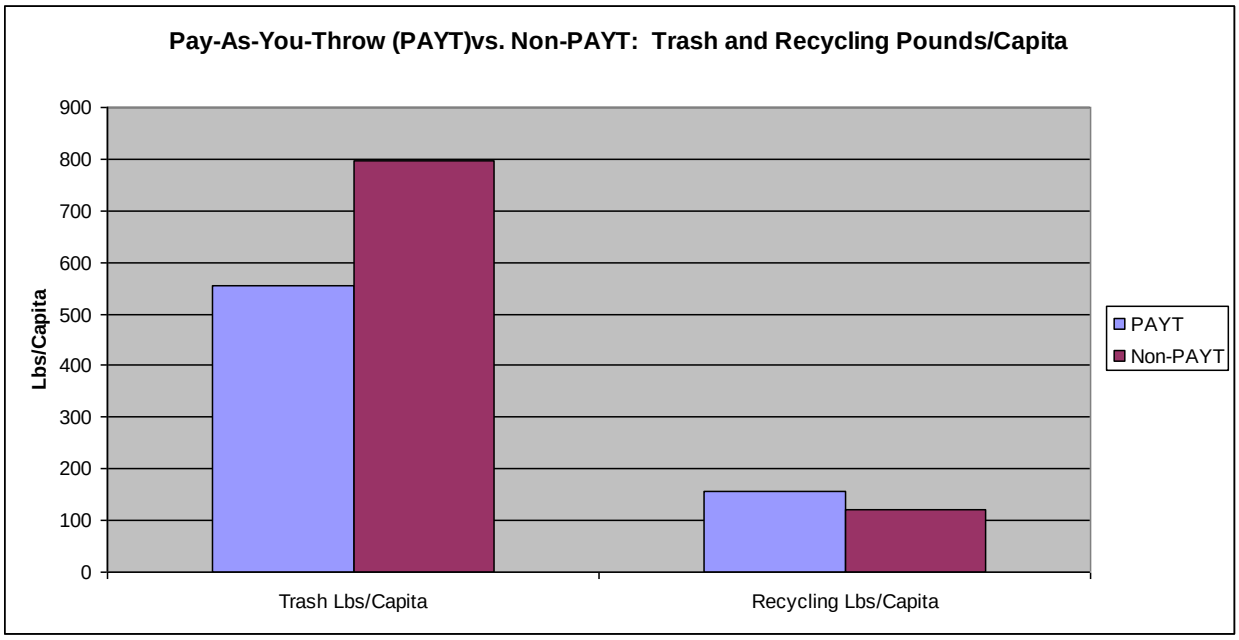

Figure 6 Average Trash Generation and Recycling Performance in PAYT vs. Non-PAYT Municipalities (recycling of paper and containers only), 2008

Objectives

- Divert 500,000 additional tons of residential materials from disposal through waste reduction reuse, recycling and composting annually by 2020.
- Work with municipalities to raise awareness among residents and establish incentives for residents to reduce waste generation and maximize reuse opportunities.
- Establish initiatives to ensure that 100 percent of Massachusetts residents are provided with convenient recycling service by 2020.
- Increase the population served by Pay-As-You-Throw to 50 percent of the state's population by 2020 (currently at 24 percent)

Action Items

- **Municipal Assistance Coordinators:** Continue to fund Municipal Assistance Coordinators (MAC) to provide hands-on technical assistance to municipalities to improve recycling, composting, and waste reduction programs and implement regional approaches to solid waste management. Over time, fund additional MAC positions to provide increased technical assistance to municipalities.

- **New Strategies to Increase Recycling Rates:** Work with municipal officials, the Legislature, and other stakeholders and convene a dialogue on new strategies and approaches to increase residential recycling rates.

- **Technical Assistance and Equipment Grants:** Provide start-up grants to municipalities for implementing designated priority programs including: Pay-As-You-Throw, automated

single stream or large cart dual stream collection, organics collection, and mandatory recycling enforcement.

- **Pay-As-You-Throw Expansion:** Through a combination of technical assistance and grants to cover start-up costs, support the development of new PAYT programs to reach the objective to serve 50 percent of the state's residents.

- **Regional Efficiency Initiatives:** Provide multi-year start-up funding for regional recycling/reuse facilities, regional solid waste/recycling districts, and equipment for regionally provided waste reduction services (e.g. yard waste grinding, compost screening).

- **Municipal Performance Based Grants:** Establish a performance-based incentive grant program through which municipalities that adopt specified program requirements can earn tonnage based grants for recycling. The program would provide a per-ton payment to municipalities that document the quantity of materials they recycled in a specific period. The program would also require that participating municipalities provide specific recycling services and incentives that would increase their performance, such as recycling in municipal buildings (including schools), holding a periodic household hazardous waste collection event, and requiring waste haulers serving customers in the town to provide recycling services.

- **Web Based Information and Tools:** Improve and expand web-based recycling information tools and templates for municipal officials.

- **Targeted Education Campaigns:** Work with private sector, local and non-profit partners to develop and implement a series of targeted education campaigns to support reducing waste, maximizing opportunities for reusing products, and increasing recycling by residents.

- **Promote and Expand Reuse Options for Residents:** MassDEP will work with municipalities and non-profit organizations to promote and expand reuse options for residents, including increasing building materials reuse centers, providing grants to support partnerships between municipalities and non-profit organizations, and promoting online reuse options.

Success Story: Throwing Away Less and Recycling More in Wrentham Through Pay-As-You-Throw

Wrentham historically provided curbside solid waste and recycling service through the tax base. But in fiscal year 2006 – grappling with budget cuts and facing a significant increase in disposal tipping fees – voters in the 3,700-resident town supported implementation of a Pay-as-You-Throw (PAYT) program. A MassDEP grant enabled Wrentham to hire two interns for approximately four months to help get the new program off the ground and educate residents about it.

Each household in Wrentham is allowed to dispose of one container of trash per week, free of charge. Additional waste needs to be placed in town trash bags purchased from local merchants for $2 each. This has created a financial incentive to throw away less, which has paid enormous dividends.

Before PAYT, Wrentham's overall recycling rate hovered at around 21 percent. One year after program implementation, the town had increased recycling to 33 percent and reduced trash by the same proportion, saving $133,803 in disposal costs, and eight out of ten households were fitting all of their trash into single containers.

Success Story: Enforcing Springfield's Mandatory Recycling Law

In September 2008, the City of Springfield received a grant from MassDEP to hire a coordinator to enforce its mandatory recycling ordinance. The coordinator monitored residential recycling participation and left "recycling violation notices" at non-compliant households. In the program's first year, Springfield's recycling tonnage increased 16 percent, and saved the City more than $60,000 in disposal costs. With these savings, the City hopes to fund a permanent enforcement coordinator position starting in Fiscal Year 2011.

Success Story: Regional Cooperation Yields Better Waste Management at Lower Costs

In 2008, the mayors of Braintree, Quincy and Weymouth – with a combined population of 83,000 – partnered in developing a regional Request for Proposals (RFP) from curbside solid waste and recycling collection service vendors. They believed the three South Shore communities would receive more qualified bids and ultimately enjoy better service and increased revenues by combining their buying power.

Bidders were required to offer service equal to or better than what the three municipalities were receiving at the time, to provide for single-stream recycling using household containers that residents had already, and to base their recycling revenue payments to the communities on flat fees rather than market fluctuations.

The selected vendor agreed to nine-year contracts with each community. Braintree, Quincy and Weymouth saw their waste management costs drop by a combined $390,000 in the first year of the new contract, which would amount to an approximate savings of $3.6 million over the life of the contract. In addition, there were significant first-year recycling revenue payments into municipal coffers: $47,386 for Braintree, $104,000 for Quincy and $71,676 for Weymouth.

3.3 STRENGTHEN INCENTIVES THROUGH PRODUCER RESPONSIBILITY

Background

In the "Beyond 2000 Solid Waste Master Plan," Massachusetts supported the creation of the Product Stewardship Institute, which has become a leading national organization in advancing product stewardship dialogue and information sharing. Massachusetts has participated in a number of Product Stewardship Institute dialogues focusing on several product categories, including electronics and paint. Massachusetts has also enacted the Mercury Management Act to keep mercury containing products out of the waste stream and has worked with the carpet industry through the Carpet America Recovery Effort (CARE). Engaging product manufacturers, distributors, and retailers in "end of life" product management reduces local government's financial burden for managing products and packaging after use, and provides incentives to change product and packaging design to facilitate recycling.

Objectives

- Advance producer responsibility for specific product categories through a combination of pilot projects, business sector partnerships, and legislative and regulatory requirements.
- Develop consistent regional approaches to extended producer responsibility systems and requirements.
- Advance product stewardship responsibility initiatives on a national level.

Action Items

Product Specific EPR

- **Electronics**: Support proposed legislation for electronics producer responsibility to shift responsibility for handling of electronics from municipalities to producers.
- **Beverage containers:** Support the proposed expanded bottle bill for water containers and sports drinks.
- **Carpet:** Develop an extended producer responsibility system for carpet. The Carpet America Recovery Effort, a voluntary industry partnership focused on increasing recovery of carpet, has laid the groundwork for increased carpet recycling. Massachusetts has contracts that include carpet recycling and recycled content carpet that are available to both state and local government. Carpet is well-suited for a producer responsibility system, as it is difficult to manage in the solid waste stream, and is sold and installed through a limited number of companies.
- **Plastic bags:** Support and oversee MassDEP's March 2009 Memorandum of Agreement with the Massachusetts Food Association (MFA) on reducing the use of plastic bags and increasing the use of reusable bags in grocery stores. Work with MFA to implement MassDEP's responsibilities under the agreement. This MOU sets four goals:
    - Setting a 33 percent reduction goal in the distribution of paper and plastic disposable grocery bags by 2013
    - Establishing incentives to encourage a reduction in the demand for bags and increased use of reusable bags by consumers
    - Establishing plastic grocery bag and other plastic packaging recycling programs at all participating supermarkets and grocery stores
    - Increasing the recycled content and/or the percentage of biodegradable grocery bags offered for distribution.

- **Ceiling Tiles:** MassDEP will promote ceiling tile recycling with existing industry take-back programs (e.g. Armstrong Ceilings and US Gypsum) through our Construction and Demolition Materials Subcommittee discussions, including:
    - Lead a ceiling tile workgroup to:
        - quantify how much ceiling tile waste material in generated in the Commonwealth and the current disposition of that material,
        - develop strategies to increase ceiling tile recycling through existing construction and demolition processors and transfer stations, and
        - promote ceiling tile recycling through Division of Capital Asset Management construction specifications.

Regional Framework Extended Producer Responsibility

- Work with other Northeast states, regional organizations, and the United States Environmental Protection Agency Region 1 to develop a model framework extended producer responsibility system that could establish a consistent regional approach to extended producer responsibility across the Northeast. Framework extended producer responsibility legislation is being developed in a number of states, including New York, and would establish a set of criteria that the state would use to designate products and/or packaging that would be subject to producer responsibility requirements.
- Work with the US EPA to ensure implementation of the RCRA 2020 Vision initiative, including advancing producer responsibility on the national level.

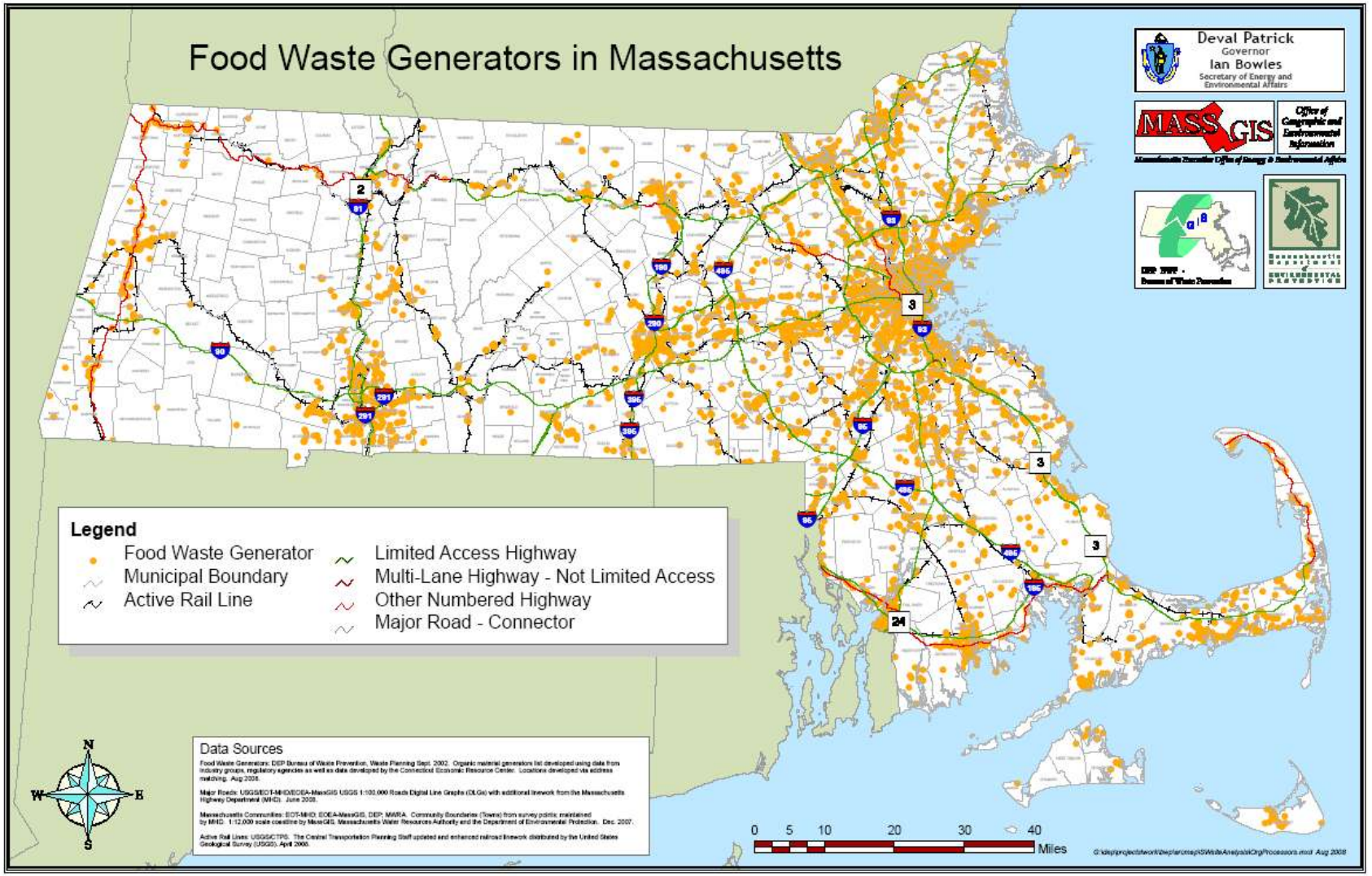

Figure 7 Food Waste Generators in Massachusetts

3.4 ORGANICS DIVERSION AND MARKET DEVELOPMENT

Background

According to Massachusetts waste characterization data, organic materials, including leaves and yard waste and food waste, comprise approximately 25 percent, or more than 1 million tons of Massachusetts municipal solid waste on an annual basis[14]. Because Massachusetts has had a long-standing ban on the disposal of leaves and yard waste, composting infrastructure for these materials is well-established. However, some leaves and yard waste continue to be disposed. And, large amounts of leftover food are generated in relatively homogenous streams at businesses such as supermarkets, hotels, convention centers, and institutional cafeterias and are sent for disposal. This material can be a valuable resource, both for producing compost products that can improve soil quality, conserve water, and reduce erosion and as a potential energy source through processes such as anaerobic digestion. The U.S. EPA and MassDEP estimate that less than 10 percent of food waste is currently diverted from disposal. Diverting organic materials from landfills in particular can make important contributions to reducing methane releases from landfills.

Diversion of source separated organics such as food waste is currently limited in large part by the capacity of processing facilities and available end markets. Therefore, a critical component of Massachusetts's strategy to increase diversion of source separated organics is to remove barriers to development of increased capacity for processing source separated materials while ensuring that such facilities receive proper oversight. MassDEP estimates that reaching our 2020 goals for food waste diversion will require additional organics processing capacity sufficient to handle 250,000–300,000 tons per year of source separated organic materials.

This would require up to 8-10 additional 100 ton per day facilities, or 16-20 50 ton per day facilities. However, it is capacity for managing this food materials can take different forms, including but not limited to, food donation and rescue, animal feed, off site anaerobic digestion and compost facilities, and on-site systems. Unlike some recyclables, it is not viable to transport leftover food materials long distances, so most of this new capacity will need to be located within Massachusetts. It is worth noting that some diversion may be accomplished through diverting leftover food through the wastewater system. To the extent this happens, the amount of additional composting or anaerobic digestion capacity needed would be reduced. In addition to the potential for siting new organics processing facilities, MassDEP has also developed regulations that will make it easier for waste water treatment plants (POTWs) to accept source separated organics to supplement existing waste water digestion facilities.

Objectives

- Divert at least 35 percent of source separated organics from disposal by 2020, which would result in more than 350,000 tons per year of additional diversion activity[15] from targeted business and institutional sectors including:
    - hotels

[14] http://www.mass.gov/dep/recycle/priorities/wcssumm.xls

[15] 12.5 percent (EPA's estimated percent of MSW that is food waste) of 2007 Massachusetts MSW generation of 8,370,000 tons is about 1,050,000 tons.

    - convention centers
    - food waste processors
    - large institutions.
- Support development of additional organics processing and hauling capacity to manage this additional source separated organics material in Massachusetts by 2020.

Action Items

- **Siting Regulations Modified: In November, 2012 MassDEP** modified the solid waste regulations to streamline the siting of facilities that take in source separated organic materials for composting or biological processes such as anaerobic digestion. See http://www.mass.gov/eea/agencies/massdep/climate-energy/energy/anaerobic-digestion/ for more information. .

- **Invest in Organics Infrastructure:** Support the development of organics processing and hauling infrastructure, including targeted grants and loans.

- **Provide Targeted Business Development Support:** Coordinate with state economic development and green jobs initiatives to support new organics processing businesses and job creation in Massachusetts.

- **Technical Assistance to Organics Processing Facilities:** Provide technical assistance to composting and other organics processing facilities to process organic materials more effectively and reduce nuisance impacts.

- **Leverage State Energy Policy Incentives:** Coordinate with the Department of Energy Resources to help organics processing facilities that can generate energy, such as anaerobic digestion, to benefit from state energy polices such as renewable energy credits.

- **State Agency Commitments to Support Organics Diversion:** Working with the state's Leading by Example program, establish state agency commitments to divert organics from disposal. In addition, MassDEP will work with up to three state facilities to site anaerobic digestion facilities on state property.

- **Municipal Organics Pilot Programs:** Work with cities and towns to pilot new approaches for collecting source separated organics from residents and small businesses or to implement increased home composting.

- **On-Farm Organics Infrastructure:** Working with the Department of Agricultural Resources, support development of on-farm organics infrastructure such as anaerobic digestion as a way to increase organics processing capacity, generate energy, and reduce greenhouse gas emissions. This would include revising regulations to increase the types and quantities of materials that farms can take in from off-site for composting and to allow farms to establish anaerobic digestion facilities. These provisions would potentially be tied to the size of the farm, performance standards, and the type of technology used.

- **Waste Ban on Commercial/Institutional Food Waste:** Establish a waste ban on commercial and institutional food waste by 2014

- **Work with Publicly Owned Treatment Works (POTWs):** Work with POTWs to increase the diversion of source separated organics as a supplement to waste water treatment sludge in anaerobic digestion facilities at POTWs.

Success Story: Massachusetts Supermarkets Organics Diversion Savings

More than 400 full-service grocery stores across Massachusetts discard an estimated 90,600 tons of material per year. In 2003, MassDEP and the Massachusetts Food Association (MFA) signed a memorandum of understanding (MOU) that established the Supermarket Recycling Program Certification (SRPC) program – an initiative to encourage full-service grocery stores to develop sustainable programs for recycling and reusing organics and other materials.

Waste disposal represents a significant and growing business cost for the supermarket industry, particularly in Massachusetts where disposal fees range from $80 to $100 per ton. As a retail sector, supermarkets operate on very slim profit margins. Since between 75 and 85 percent of the waste they generate is biodegradable, sending their organics to large-scale composting operations or to farms for animal feed is a money-saving alternative to disposal, not to mention better for the environment.

Today, more than 200 stores from six major chains – Big Y Foods, Hannaford Bros., Roche Bros., Shaw's, The Stop & Shop Supermarket Co. LLC and Whole Foods Markets – are diverting organics to reuse or recycling, and saving between $3,000 and $20,000 per location per year in disposal costs.

Success Story: Food Service Businesses Increase Composting, Reduce Greenhouse Gas Emissions

With MassDEP funding and technical assistance, the City of Cambridge partnered with its recycling hauler, Save That Stuff, to implement curbside collection of food waste from local businesses. The collaborative effort identified a sustainable customer base, developed a pricing structure to be more cost-effective than trash disposal, located a facility to accept food waste for composting, selected the necessary collection equipment, and trained customers on taking advantage of the program.

Three years later, more than 200 Cambridge businesses and institutions – including cafeterias, coffee shops, florists, hotels, restaurants and supermarkets, as well as the city's school system – are participating. For every ton of food waste composted, nearly a ton of greenhouse gas emissions is avoided, and the program is now collecting an average of 14 tons of food waste per day.

Success Story: Farm-Based Anaerobic Digestion Moves Forward

Five Massachusetts farms have partnered together to develop an innovative farm-based anaerobic digestion network. Through this project, farms will blend in source-separated food waste and dairy manure into anaerobic digestion units. These units will produce methane gas that will be run through a combined heat and power system that will create heat and electricity that can help to power the farm, as well as electricity that can be transmitted and sold through the electrical grid. This innovative project involved assistance and regulatory approvals from environmental, agricultural, and energy agencies from state and federal government, as well as local agencies. This collaborative project enables the farms to benefit from the economies of scale of a larger project and to generate an additional revenue source that can make their farming operations more sustainable. The first digester began operation in summer 2011.

3.5 CONSTRUCTION AND DEMOLITION MATERIALS DIVERSION AND MARKET DEVELOPMENT

Background

In 2008, Massachusetts construction and demolition (C&D) materials were recycled at a rate of 66 percent. While this recycling rate is high, the bulk of the recycled tonnage is asphalt, brick, and concrete (ABC), which is routinely recycled (2,330,000 out of 2,520,000 tons). When the ABC tonnage is excluded from the C&D data, the remaining material is only recycled at a rate of 14 percent. Considering that about 700,000 tons of Massachusetts C&D material is disposed of each year and an additional 400,000 tons is managed as fines and residuals (a relatively low value use), there is considerable room for increased C&D recycling.

A 2007 report conducted for MassDEP by DSM Environmental estimates that the three largest components of building related C&D material by weight are wood (31 percent), asphalt roofing materials (11 percent), and drywall (gypsum wallboard) (10 percent). (This does not include asphalt paving and concrete, which are already recycled at a high rate from road and bridge construction projects.) These three materials represent the top targets for increased C&D diversion from disposal. MassDEP also will target other C&D materials such as carpet and ceiling tiles when they can be effectively separated and diverted for recycling in large quantities. Increasing C&D recycling will require diverting materials from low value uses such as fines and residuals as well as diverting materials from disposal.

Objectives

- Increase the recycling rate for C&D materials excluding ABC to 50 percent by 2020. Based on 2007 C&D generation, this would mean reducing C&D disposal and landfill uses such as alternative daily cover and grading shaping materials by a total of 400,000 tons annually by 2020.

Action Items

- **Increase C&D Recycling at C&D Processors:** Work with C&D processors and transfer station owners to develop connections to recycling markets, develop consistent recycling requirements and incorporate them into C&D recycling facility permits.

- **Coordinate C&D Materials Recycling with other State Agencies:** Work with other state agencies (e.g. DCAM, MassDOT and Massport) to secure commitments encouraging the diversion of C&D materials from disposal including changing construction specifications.

- **Support C&D Market Development:** Work with the Massachusetts Department of Transportation (MassDOT) and other Northeast state transportation departments to develop specifications for the use of recycled asphalt shingles in asphalt paving.

- **Product Take-back and Recycling:** Work with product manufacturers to increase take back and recycling of products such as gypsum wallboard, ceiling tile (e.g., Armstrong Ceiling Tile Take-back program), and carpet.

- **Recycling Loan Fund:** Make C&D materials a priority category for Recycling Loan Fund projects and pursue opportunities to apply other state economic development assistance programs to support growth in C&D recycling.

- **C&D Material Specifications:** Work with the construction and demolition industry to develop common specifications for different categories of materials to facilitate development of consistent material streams for end markets.

- **Targeted Waste Bans:** concurrent with market development, develop waste disposal bans for gypsum wallboard, asphalt shingles, carpet and ceiling tiles.

- **Eliminate Regulatory Barriers or Disincentives**: Ensure that regulatory or permit requirements do not place C&D recycling businesses at a disadvantage compared to disposal options (e.g., modify Site Assignment regulations at 310 CMR 16.05(3)d Conditionally Exempt Recycling Operations to include construction and demolition materials.)

- **Massachusetts Environmental Policy Act Greenhouse Gas Reviews**: Leverage the MEPA greenhouse gas reduction provisions to improve C&D management, such as using recycled C&D materials, procuring materials locally, and achieving a minimum recycling rate for development projects.

- **C&D Source Separation**: Work with the construction industry to maximize the amount and value of materials recovery from construction and demolition sites, including implementing source separation, deconstruction, and other materials reuse practices at certain construction/demolition sites. This could be tied to the size of the site (i.e., only at sites where they have the space for multiple containers). In some cases, source

separation may be the best practice. In other cases, delivering mixed materials to a C&D processor may be more cost-effective.

- **Coordinate C&D Policies with other Northeast States**: Work with other Northeast states to establish consistent policies and programs for C&D materials to achieve greater market efficiencies and development of regional markets.

- **Forge Connections between C&D Debris Management and Green Building**: Work with the US Green Building Council and architects to connect C&D recycling and waste reduction initiatives with the green building movement (e.g., LEED credits for recycled content or locally-procured materials, separating materials for recycling and/or reuse at the construction site)

Success Story: C&D Reuse and Recycling at St. Paul's Cathedral, Worcester

Consigli Construction Inc. was the lead contractor for interior renovation of a reception area in the basement of St. Paul's, a 130-year-old granite cathedral located in a congested urban neighborhood. Consigli recycled and reused a total of 145 tons of material and disposed of 39 tons of mixed construction and demolition waste for a total waste reduction rate of 79 percent.

Highlights of this project included:

- **Wood Reuse.** Consigli saved St. Paul's $6,075 by reusing five tons of existing wainscoting. Replacement material would have cost about $9,000 and disposal another $575. Labor costs associated with restoring and reusing the original wainscoting amounted to $3,500. The project architect also emphasized the historic and economic value of preserving the original woodwork, which was custom-made for the cathedral during renovations made at the turn of the 20th century. By carefully rehabilitating original woodwork, the contractor not only reduced costs – installing "new" antique ash woodwork would have been much more expensive – but also preserved an important piece of the building's history.

- **Concrete Recycling.** Due to work site constraints, Consigli was unable to crush and reuse concrete on-site. Instead, the company removed 140 tons of concrete to an off-site recycling facility, saving St. Paul's approximately $17,700 (the difference between the projected $18,620 cost of disposal and the $936 actual cost of recycling).

3.6 BUILD LOCAL AND REGIONAL RECYCLING MARKETS

Background

Sections 3.4 and 3.5 include strategies specifically focused on building markets for organic materials such as source separated food waste and certain construction and demolition materials. Strong markets also are important to support sustainable cost-effective recycling programs for other materials. Through the Commonwealth's Leading by Example program (Section 3.7), Massachusetts will stimulate new recycling markets through state agency procurement practices. In particular, state agency purchases will be targeted to support local and regional market outlets

that can keep the benefits of recycling local and also provide more diverse alternatives to export markets. This section includes market development initiatives that are not covered in other sections of the *2010-2020 Plan*. As resources are available, Massachusetts also will provide direct funding and assistance to recycling and composting businesses to build new and expanded recycling and composting markets in Massachusetts.

Objectives

- Provide direct support to businesses developing new or expanded recycling or composting capacity to build capacity and markets for producing recycled materials.
- Develop new green jobs through the development of new recycling markets.
- Support the development of local market outlets for recyclable or compostable materials to develop economic development and job opportunities in Massachusetts and reduce reliance on export markets.

Action Items

- **Targeted Capacity Development:** Solicit and fund project proposals to develop new processing or manufacturing capacity for priority materials and provide direct start-up funding assistance to support these projects.

- **Recycling Business Grants:** Provide direct grants to new or expanded recycling businesses to support and provide incentives for the development of new capacity and build new markets for recyclables.

- **Recycling Loan Fund:** Continue to provide low interest loans to provide financing for companies investing in recycling and composting infrastructure. Appendix G summarizes the loans awarded to date.

- **Regional Recycling Market Development Center:** Partner with colleges, universities, and other Northeast states to conduct research to identify new uses and markets for materials that are currently disposed due to lack of markets.

3.7 COMMONWEALTH LEADING BY EXAMPLE

Background

In April, 2007, Governor Deval Patrick established, the Commonwealth's Leading by Example Program (LBE) through Executive Order No. 484, "Leading by Example - Clean Energy and Efficient Buildings." The Executive Office of Energy and Environmental Affairs (EEA) and the Executive Office for Administration and Finance (A&F) jointly oversee the program through different divisions and departments, including the Department of Energy Resources, Department of Environmental Protection, Division of Capital Asset Management, and the Operational Services Division.

The LBE Program applies to all of Massachusetts' executive agencies and public institutions of higher education. These agencies and institutions own 65 million square feet of buildings and 8,000 vehicles, employ over 65,000 people, and include 29 college campuses. Through LBE is reducing the environmental impacts of state government operations, including climate and energy impacts and sustainability activities within state government through waste reduction, water conservation, green buildings, alternatives fuels, efficient transportation, and recycling.

The Operational Services Division, the central purchasing office for the Commonwealth, administers the Environmentally Preferable Product Procurement Program (EPP Program). The Commonwealth purchases an estimated $600 million of goods and non-construction services per year, which result in environmental and public health impacts related to the production, transport, use, and disposal of these products and services. The EPP Program uses the Commonwealth's purchasing power to reduce environmental and public health impacts that result from state government operations and to foster markets for products that contain recycled content, conserve energy and water, reduce the use of toxic substances, and minimize waste.

In recognition of the fact that OSD and the EPP Program have already made progress in integrating environmental and sustainability considerations into the many statewide contracts used by Commonwealth agencies and by many other eligible public entities, Governor Patrick issued Executive Order 515 on October 27, 2009, *Establishing an Environmental Purchasing Policy.* This executive order strengthens and expands Massachusetts' leadership role in developing innovative and cost-effective materials management and waste reduction strategies and serving as a model for businesses and other institutions in the Commonwealth.

Objectives

- Support the Operational Services Division and other state agencies to fully implement Executive Order 515.
- Ensure that state agencies recycle all materials that are banned from disposal and go beyond compliance to develop innovative pilot approaches that can serve as models for others in Massachusetts to follow.
- Expand the Commonwealth's already considerable use of state procurement as a tool to support recycling markets, both to increase purchasing of existing and established recycled content products, as well as to explore opportunities to purchase innovative new recycled content products.

Action Items

- **State Agency Recycling and Composting:** Ensure that all state agencies recycle or compost, as appropriate, all waste ban materials and divert these materials from disposal. Work with state agencies to improve and standardize state agency contracts for solid waste and recycling services to support increased recycling and reduce solid waste management costs.

- **Purchase only Recycled Content Products:** Through the Commonwealth's Leading by Example initiative and Executive Order 515, designate product categories for which state agencies will buy only recycled content products.

- **Explore New Recycled Product Opportunities:** Continue to identify new recycled product purchasing opportunities.

- **Regional and Local Government Purchasing:** Promote recycled and environmentally preferable product purchasing by state authorities and local and regional government agencies.

- **Consider Total Cost of Ownership:** Agencies shall consider the "total cost of ownership" of their purchases, including costs associated with the transportation, use, operation and disposal of such products and services in their departmental and state contract procurements.

- **Supply Chain Management Practices**: Implement improved supply chain management practices as part of state procurement practices to drive more efficient production, distribution, and packaging of products purchased by state agencies.

- **Product and Packaging Take Back:** Where possible, modify contracts so that vendors are responsible for taking back product packaging and/or transportation packaging for recycling and recycling or reusing product components after their useful life.

- **Track and report on benefits of environmental purchasing.** OSD and the EPP Program will work with agencies to track their purchases, quantify benefits and report results on an annual basis.

Success Story: Spurring State Purchasing of Recycled Content Products

The EPP Program leverages state buying power to reduce the environmental impacts of government activities and to strengthen markets for recycled content products, as well as other goods and services that benefit the environment. In the 15 years since the EPP program began, state purchases of these products and services have increased from $5 million to more than $200 million per year.

Beyond the dollars spent on EPP goods and services, the program reports on a number of key benefits for state agencies and Massachusetts taxpayers. EPP staffers have quantified reductions

in greenhouse gas emissions, energy use and state spending – more than $2 million over the last two years – that the program has netted.

3.8 KEEP TOXICS OUT OF THE WASTE STREAM

Background

Massachusetts has a long-standing policy commitment to reduce the toxicity of its waste stream, both by reducing the amount of toxics used in products and by supporting the development of local and regional collection programs to collect and safely manage hazardous household products. In 2006, the Massachusetts Mercury Management Act was passed which will phase out mercury containing products and establish recycling programs for products that will continue to contain mercury. In addition, MassDEP has adopted regulations to lower the volatile organic compound (VOC) content of certain consumer products and paints, and has supported legislation to establish manufacturer funded electronics recycling programs. Massachusetts also has a long-standing commitment to toxics use reduction through the Toxics Use Reduction Act (TURA), which is implemented by three partner agencies, MassDEP, the Office of Technical Assistance and Technology, and the Toxics Use Reduction Institute at UMass Lowell. Finally, Governor Patrick's Administration has worked closely with the Legislature and stakeholders to develop a "Safer Alternatives" bill that will phase out toxic chemicals in products when alternative materials can be feasibly substituted.

Currently, approximately 90 percent of Massachusetts residents have access to one or more hazardous product collection events per year. Fifty-eight percent of residents have access to two or more collection events per year. However, many of these collection events are at risk due to local government budget cuts and MassDEP expects that this level of access will be reduced over the next several years until state and local government budgets rebound. To reduce the impact of these cutbacks, MassDEP will work with local and regional governments to fine cost-effective regional hazardous product collection programs to maintain existing access as much as possible and to increase the level of access in future years when budgets rebound.

Objectives

- Substantially reduce products and packaging containing toxics in the solid waste stream.
- Ensure that Massachusetts policies take advantage of national and international trends in chemicals policy.
- Reduce toxic chemicals used and stored in schools.
- Ensure that 100 percent of Massachusetts residents have access to at least one collection event per year for hazardous household products and that 75 percent of residents have access to two or more collection events per year.

Action Items

- **Mercury Management Act**: Continue to implement the Mercury Management Act, as resources allow.

- **Electronics Recycling:** Support passage of the "E-waste" bill, which will require manufacturers to establish/fund cost-effective recycling programs for their products after use, shifting this cost off of the municipal tax base and shifting incentives for manufacturers to place greater emphasis on recycling and end of life management in their product design.

- **Safer Alternatives:** Support passage of "Safer Alternatives" bill, which will phase out toxic chemicals in products when alternative materials can be cost-effectively and feasibly substituted.

- **Municipal Waste Combustor Material Separation Plans:** Continue to oversee implementation of material separation plans to divert mercury containing items from waste being sent to municipal waste combustors.

- **Regional Hazardous Product Collection Programs**: Through technical assistance and other incentives, support the development of regional collection programs for hazardous products such as reciprocal, multi-town collection events, and shared regional collection centers.

- **Regional and National Chemicals Policy Development**: Participate in inter-state and national chemicals policy development, including new approaches to identifying alternatives to using toxic chemicals.

- **School Chemical Management Program**: Continue to implement a school chemicals management program to provide grants, assistance, and training to clean out chemicals in schools and implement school chemicals management systems.

Success Story: Collecting Hazardous Household Products Regionally

Residents in 42 communities in and around Essex County have access to the collection of household hazardous products (HHP) through an innovative regional contracting "open approach." Each participating community can conduct such collection events open to its own residents as well as those in other participating communities. Non-residents attending an event work directly with the vendor who accepts waste and charges them accordingly. To date, over 60,000 car loads of HHP have been collected through this program. This regional collaboration provides many benefits, including:

- A cost-effective and flexible system for cities and towns;
- Access for residents to many more collection events than just the ones scheduled in their community; and
- Consistent pricing and streamlined contract administration.

CHAPTER FOUR:
IMPROVE THE ENVIRONMENTAL PERFORMANCE OF SOLID WASTE FACILITIES
(OBJECTIVE 2)

4.1 MUNICIPAL WASTE COMBUSTION MORATORIUM

Background and Objective

Massachusetts has had a moratorium to limit certain forms of disposal capacity since 1990. In 2000, Massachusetts lifted the moratorium for landfills, given that this disposal capacity could be constructed and implemented in short-term phases, but maintained the moratorium on municipal waste combustion due to concerns that such long-term fixed disposal capacity could result in overbuilding in-state management capacity.

When the moratorium was issued, it was intended for the technologies in existence at the time, which involved mass burn combustion of municipal solid waste. Since that time, a variety of alternative technologies (such as gasification and pyrolysis) have advanced. MassDEP is seeking to encourage the development of technologies for converting municipal solid waste to energy or fuel (e.g., gasification and pyrolysis) on a limited basis.

Action Item:

MassDEP will modify the moratorium on municipal solid waste combustion to encourage the development of alternative technologies (e.g., gasification and pyrolysis) for converting municipal solid waste to energy or fuel on a limited basis. The moratorium will remain in place for new capacity for traditional combustion of municipal solid waste. Total new capacity for gasification or pyrolysis of municipal solid waste will be limited statewide to 350,000 tons per year. This limit is set at ½ of the projected in-state capacity shortfall of approximately 700,000 tons if our disposal reduction goals are met, ensuring that we do not overbuild long-term disposal capacity. These technologies will be used for those portions of the waste stream for which reuse or recycling are not an option. Proposed projects will have to meet stringent emissions, energy efficiency, and upfront recycling standards. New facilities will be subject to the same site assignment rules as other facilities. MassDEP will seek stakeholder input while developing performance standards for municipal solid waste conversion facilities. Any new facilities will be required to employ state of the art processing technologies focused on removing recyclable materials to the greatest extent possible so that these facilities do not supplant recycling or re-use options.

Existing combustion facilities would be allowed to continue their operations within the limits of their current permitted capacity as established by their solid waste permit and air plan approval. If an existing facility needs to be rebuilt or repaired to the extent that it is defined as a facility "modification" under 310 CMR 7.08, then its reconstruction would be subject to the same moratorium restrictions as new facilities. This provision will not apply to upgrades of emission control equipment.

MassDEP will continue to assess the potential for using source-separated materials as fuels, including their air emissions and the environmental and health risks that each type of facility may pose. An assessment of the environmental and public health impacts of burning C&D materials for energy generation will be conducted when funding allows or an actual proposal is presented and other materials will be assessed over time as needed.

4.2 IMPROVE SOLID WASTE FACILITY WASTE BAN AND RECYCLING PERFORMANCE

Background

Waste bans are a key tool available in Massachusetts to reduce disposal of recyclable and compostable materials and increase recycling and composting. The waste ban regulations require landfills, municipal waste combustors, and transfer stations to develop and implement waste ban plans that include ongoing monitoring for banned materials, comprehensive inspections of waste loads, record-keeping and reporting, and notification to waste haulers and generators of failed loads. Through its own inspections, MassDEP continues to see high levels of banned materials and large numbers of failed loads, indicating the need to improve waste ban compliance and enforcement among all responsible parties – landfills, municipal waste combustors, and transfer stations, waste haulers, and waste generators. In a recent round of inspections at landfills, municipal waste combustors, and transfer stations, MassDEP staff inspected over 1,300 loads and determined that about 20 percent of these contained unacceptable quantities of banned materials. As a result, MassDEP issued notices of noncompliance to 78 waste generators and 23 notices of non-compliance to haulers.

While disposal facilities do not directly control how businesses, institutions and individuals manage their waste, effective compliance with waste ban plans by landfills, municipal waste combustors, and transfer stations is an important component of the waste ban system and can help minimize the disposal of banned materials. This section focuses on improving the role that landfills, municipal waste combustors, and transfer stations play in implementing waste bans. This work will be complemented by initiatives to improve waste ban compliance and increase recycling by waste generators and haulers, including filing legislation that would require haulers to play a stronger role in education and providing recycling services. These initiatives are described in Section 3.1.

Objectives

- Ensure that solid waste facilities comply with their waste ban plans.
- Increase the stringency of waste ban oversight and inspections at solid waste facilities, including transfer stations.
- Improve the quality of waste ban failed load record-keeping and reporting.
- Improve our understanding of the composition of the materials that are disposed of at disposal facilities in Massachusetts, including what portion are recyclable or compostable materials.

Action Items

- **Municipal Waste Combustor Renewable Energy Credit Requirements** – Implement expanded waste ban requirements for municipal waste combustion facilities that participate in the Class II Renewable Energy Credit (REC), or Waste to Energy Credit, program. (Note: These requirements are already incorporated into municipal waste combustion facility permits.) In order for these facilities to be eligible to earn these credits, they need to meet several requirements related to waste bans, including:
    - Establish and implement an electronic tracking system for waste ban-related information for all waste loads received;
    - Establish a contract with a waste ban compliance professional to assess the waste ban compliance by haulers and generators delivering loads to the facility; and
    - Conduct a waste composition study periodically on the waste received by the facility

- **Institute improved landfill waste ban compliance requirements**, similar to what is required of waste to energy facilities under the REC requirements described above.

- **Monitor landfill, municipal waste combustor and transfer station compliance** with waste ban plans and take enforcement where needed.

- **Review and analyze waste ban failed load data reported by** landfills, municipal waste combustors, and transfer stations on annual facility reports to ensure complete and accurate accounting of failed loads containing unacceptable levels of waste ban materials.

- **Review and revise MassDEP's regulations and guidance regarding facility waste ban plans** to drive more effective implementation of the waste bans at landfills, municipal waste combustors, and transfer stations. Specific issues include the number and type of inspections required and whether de minimis quantities that determine what constitutes a failed load should be changed.

- **Expand waste bans** to include additional materials such as commercial and institutional food waste, gypsum wallboard, and asphalt shingles.

4.3 IMPROVE ENVIRONMENTAL PERFORMANCE OF LANDFILLS AND MUNICIPAL WASTE COMBUSTORS

Background

Massachusetts regulations for landfills and municipal waste combustors are among the most stringent in the country. However, new opportunities may emerge to further improve the environmental performance of these facilities. MassDEP will continue to evaluate opportunities for improving the environmental performance of both landfills and municipal waste combustors. This includes reducing emissions, increasing separation and diversion of recyclables (also discussed in Section 4.1) and increasing the amount of energy generated by existing solid waste facilities. Although Massachusetts will not re-establish a moratorium on new landfill capacity,

no new landfill capacity is projected to be developed over the next decade, and in-state landfill capacity is projected to decline from just under 2 million tons in 2009 to just over 500,000 tons in 2020.

MassDEP recognizes that there are important concerns about disproportionate environmental impacts and risks in environmental justice communities. The Executive Office of Energy and Environmental Affairs (EEA) has established an Environmental Justice policy that addresses environmental justice concerns with facility siting for all types of facilities through the MEPA review process. MassDEP also is working to reduce environmental impacts on environmental justice communities through our strategy to reduce emissions from diesel vehicles, including trash and recycling trucks, that impact environmental justice communities.

Objectives

- Improve the environmental performance of existing landfills and municipal waste combustors.
- Improve MassDEP's authority to address pollution and threats of pollution at both currently operating and closed solid waste facilities.

Action Items

- **Municipal Waste Combustor Emission Reductions:** Develop regulatory revisions that would further tighten emission and air pollution control system requirements for municipal waste combustors based on best available control technology, for nitrogen oxides and other emissions of concern such as dioxin and mercury. These changes would be consistent with the EPA maximum achievable control technology rule. When possible within the parameters of existing facilities, enable facility modifications to improve the energy conversion efficiency of existing facilities.

- **Increased Authority over Problem Sites:** File and/or support legislation to amend M.G.L. c. 21H to allow the agency to use existing financial assurance mechanisms or state funds to conduct response actions at facilities when permittees are unwilling or unable to do necessary work. Legislative amendments would include provisions to authorize MassDEP to access sites and expend funds when facility conditions present a significant risk or harm to public health, safety, welfare or the environment or when a significant public nuisance warrants state intervention. Judicial review would be limited to the administrative record in a cost recovery claim after the completion of needed remedial actions.

- **Renewable Energy at Closed Landfills**: Encourage owners of closed landfill facilities to build renewable energy generation facilities (e.g., solar arrays and wind turbines) at those locations.

- **Landfill Oversight**: Building on the more stringent regulations that MassDEP established based in the Beyond 2000 Master Plan, MassDEP will work to ensure that both active and closed landfills comply with stringent environmental requirements and that any inactive landfill closure projects are safely implemented.

- **Mechanically Stabilized Earth Berms**: Several Massachusetts landfill operators have requested approval from MassDEP to construct mechanically stabilized earth (MSE) berms. MSE berms provide more disposal capacity on the existing footprint of a landfill by building a wall structure (the MSE berm) around all or a portion of the landfill, and then filling the space between the wall and the existing side slope. MSE berms may also create capacity by allowing the landfill to be built higher. MassDEP has approved these berms as part of closure, remediation or post-closure development purposes and has approved a pilot MSE berm project at the South Hadley landfill. This pilot project will be used to inform future MassDEP policy regarding MSW berms at landfills.

- **Food Waste Separation/Processing at Landfills*:*** To prepare for the development of a waste ban on commercial and institutional food waste (see section 3.4), MassDEP will work with landfill operators on demonstration projects to test composting and/or biological treatment technologies that could process food waste in municipal solid waste prior to landfill disposal.

CHAPTER FIVE:
STRATEGIES TO DEVELOP INTEGRATED SOLID WASTE MANAGEMENT SYSTEMS
(OBJECTIVE 3)

Background

The strategies to address the first two objectives of this plan, increasing recycling and improve the environmental performance of solid waste facilities are covered in Chapters 3 and 4. There are many important interconnections between these objectives. For example, improving waste ban implementation at disposal facilities connects closely with initiatives to increase recycling by businesses and institutions. This chapter addresses a newly evolving trend in solid waste and materials management that is gaining momentum nationally and internationally – developing comprehensive systems that integrate recycling and composting programs with innovative facility designs to optimize recycling and material recovery.

The best example of this type of approach in Massachusetts is provided by Nantucket, which has achieved a 91 percent recycling rate through an integrated solid waste management system. While Nantucket's island environment created unique economic and operational conditions that drove them towards this system, other Massachusetts communities can achieve similar successes through building customized systems building on their existing recycling and solid waste management programs.

Objectives

- Develop and test innovative integrated solid waste management system approaches on a local and/or regional basis that can be used as models for other communities.

Action Items

- Work with interested municipalities and businesses to develop integrated solid waste management systems that maximize recycling and composting and minimize the disposal of residual materials.
- Pilot innovative approaches that can divert as much as 100 percent of waste materials from disposal and, therefore, help achieve the goal of zero waste at a local and regional level. MassDEP anticipates that these approaches would rely on a combination of comprehensive collection programs, incentive systems to maximize diversion, strong regulatory initiatives, and innovative processing facilities that demonstrate exemplary environmental performance.